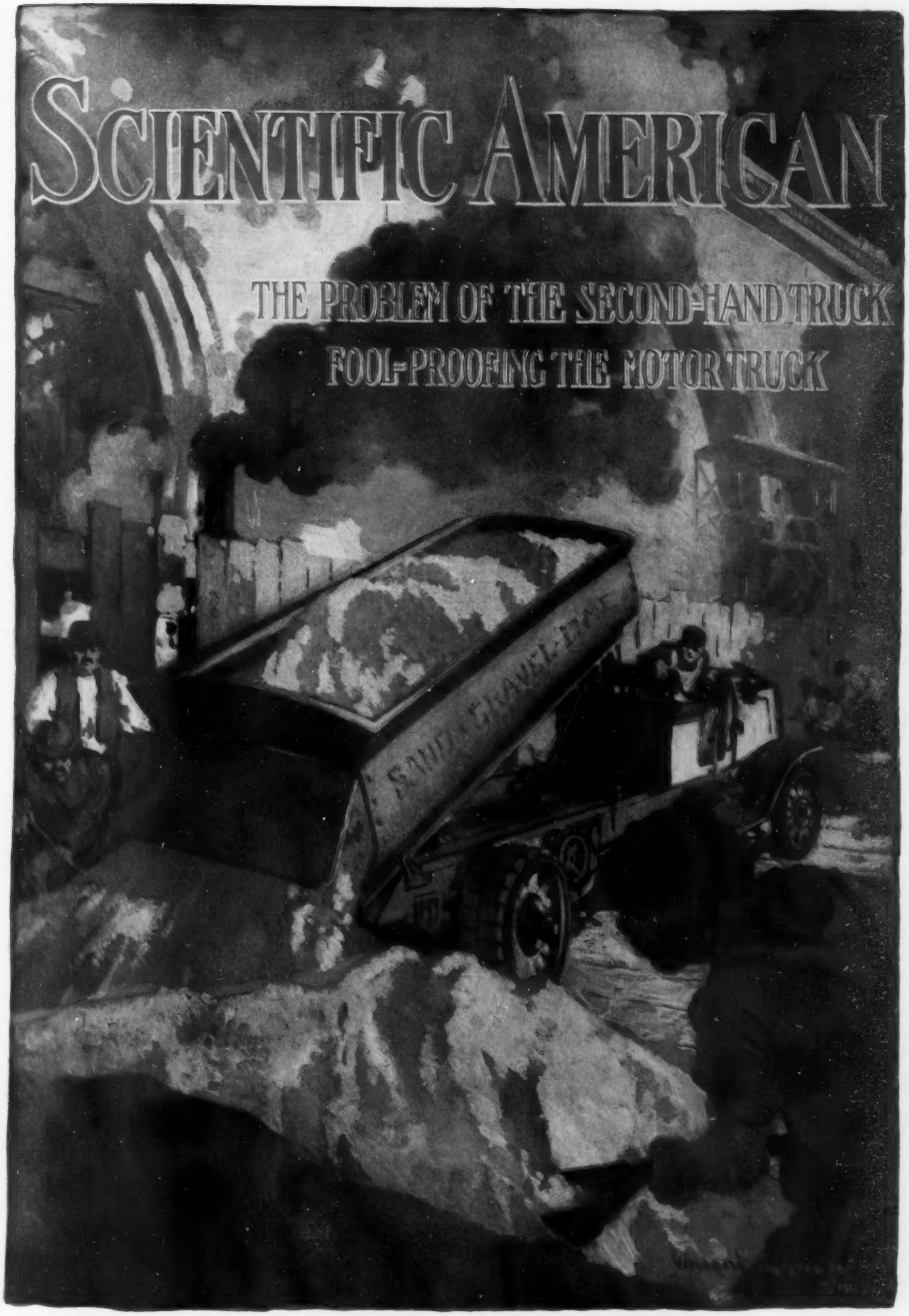
SCIENTIFIC AMERICAN



THE PROBLEM OF THE SECOND-HAND TRUCK

FOOL-PROOFING THE MOTOR TRUCK

Vol. CX. No. 5
January 31, 1914

Munn & Co., Inc., Publishers
New York, N. Y.

Price 10 Cents
$3.00 A Year

WHITE TRUCKS PREDOMINATE

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2. The most durable truck in service. White Trucks are constructed of the finest materials known to the science of metallurgy, and the scientifically heat-treated steels used in White Trucks continue to give maximum service long after common materials have worn out.
3. The most reliable truck for continuous operation. Records show conclusively that White Trucks require less attention to keep them in good running order, and lose the minimum amount of time for repairs.
4. Correct distribution of chassis and load weight, affording the least amount of wear on tires, and making them the easiest for the driver to operate. Ease of operation is extremely important in the congested traffic in which motor trucks are used.
5. Simplicity and accessibility of construction, allowing the mechanism of White Trucks to be easily understood and mastered, and quickly reached when necessary.
6. A variety of load capacities suitable for practically all motor truck transportation. White Trucks are built in capacities of ¾, 1½, 3 and 5 tons.
7. Uniform design of all models throughout, making it possible to operate a fleet of various capacity units with the least amount of mechanical problems and supervision.
8. Sound and business-like selling policies, and efficient and business-like service to White Truck Owners after the truck has been purchased. White Service Stations, completely equipped, are located in every center of motor truck operation.
9. The responsibility and firmly intrenched position of The White Company, one of the oldest in the motor industry. Responsible firms prefer to purchase their truck equipment from responsible manufacturers.

These, then, are the principal reasons for the preference given to White Trucks wherever motor trucks are used. The majority of truck users are today buying White Trucks, and those who have experimented with other trucks in the hope of finding something just as good at a lesser price have, sooner or later, purchased Whites. And once White Trucks have been installed, the comparisons are so overwhelmingly in their favor that the remainder of the truck equipment is invariably White.

White Trucks are now used in so many varied lines of service, and under so many different conditions, that data is available for practically every truck requirement.

These Facts and Figures will be gladly furnished upon request

THE WHITE COMPANY
CLEVELAND

Both in quantity and value of production the largest manufacturers of Commercial Motor Vehicles in America

SEVENTIETH YEAR

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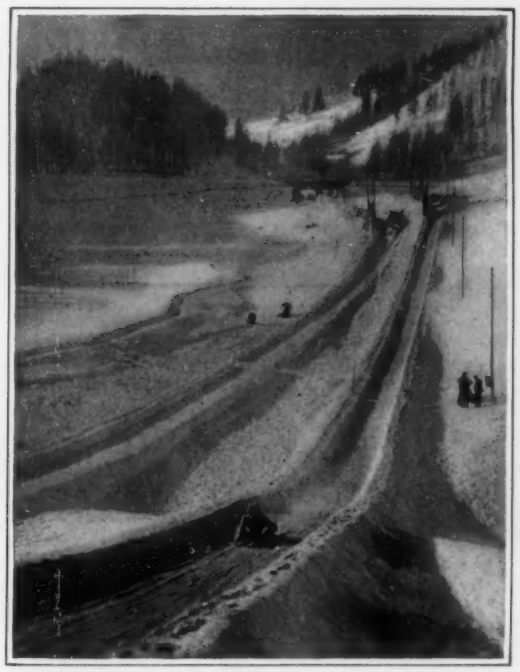

The St. Moritz runs. On the left the Bob Run; on the right, the Cresta Run.

Taking a sharp corner in the Schatzalp-Davos Run.

Start of an enlivening ladies' ski Kjöring race at St. Moritz.

Winter Sports in Switzerland

WHILE Switzerland in summer is famous for her exquisite color combinations, Switzerland in winter charms as a dazzling vision in white. Ice and snow everywhere, glistening and sparkling. Never before has the sun been shining with more brilliancy, never before have the heavens shown a purer and deeper blue. The air is crisp and invigorating, and its effects upon the human body and mind are altogether marvelous.

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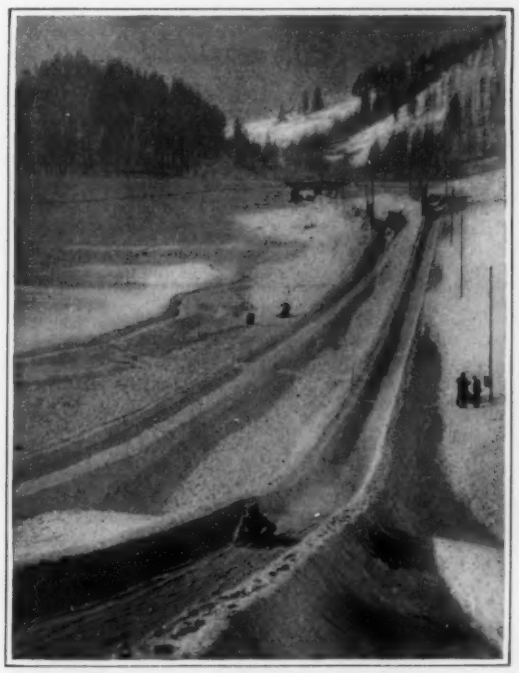

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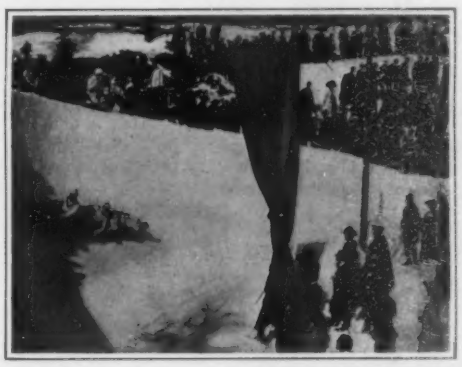

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Founded 1845

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Munn & Co., Inc., 361 Broadway, New York

The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

The purpose of this journal is to record accurately, simply, and interestingly, the world's progress in scientific knowledge and industrial achievement.

One-man Control of the Panama Canal

IT is announced from Washington that the President intends to appoint Col. George W. Goethals as the first governor of the Canal Zone. It is stated that an alternative arrangement was presented by the civilian commissioner at the Zone which contemplated a commission of three. Our President, as usual, has chosen the wiser course. The nation has had considerable experience with commissions at Panama. In the earlier phases of the work, they succeeded one another, after various degrees of failure, and it was only when one strong, capable and understanding man was placed in absolute control that order was brought out of chaos, and the great work of construction began to move with ever lengthening strides toward its ultimate completion.

The United States has learned several lessons from its Panama Canal experiences, and one of the most valuable of these is that among our many great national undertakings there will now and then arise one that calls for a single controlling hand, unhampered by the vagaries and futilities of a commission. It is very fitting, moreover, that the man who has been chiefly responsible for the success of the work should be its first governor. There can be no question that the appointment of Col. Goethals will meet with widespread national approval.

The Safety of Submarines

DEPLORABLE as is the loss of life, amounting in the past ten years to some 200 officers and men, which has occurred through accidents to submarines, we must not allow these disasters to shake our faith in the efficiency and safety of the modern up-to-date vessel of this type.

In the first place, it is significant that of the seventy-seven men that have been lost in the British service, the greater part have gone down in submarines of the earliest type built for that navy, and known as the A-1 class. So, also, the disasters in the French navy have generally happened to submarines of the earlier and more or less experimental types. That even these cruder vessels can be operated with safety is proved by the fact that we have in our own navy several submarines of practically the same design as those that have been lost in the British navy, and yet we have never lost a submarine, nor the life of a single man.

The submarines which have been built during the past four or five years, and those now under construction, are greatly superior to the first smaller vessels. As a matter of fact, among our own officers it is considered that no special risk attaches to submarine service. Our submarine flotillas come and go as they please, and do not hesitate to make extensive deep-sea voyages; as witness the recent 700-mile trip of several of these craft from Cuba to the Atlantic entrance of the Panama Canal.

An Ill-considered and Pernicious Bill

MEASURES of unbelievable inconsistency have occasionally been passed in the halls of Congress; but we doubt if those august chambers have ever witnessed such an act of stultification as was perpetrated by the recent passage in the Senate of what is known as the Seamen's Bill. We speak advisedly, for what other term than stultification can be applied to the action of the Senate when it deliberately passes a bill which is so drawn as to completely defeat the very object at which it aims? The bill in question is designated as "An act to promote the welfare of American seamen in the Merchant Marine of the United States; to abolish arrest and imprisonment as a penalty for desertion and secure the abrogation of treaty provisions in relation thereto; *and to promote safety at sea*."

Surely it will be agreed that the last named object, "safety at sea," is far and away the most important of those named in the bill. Everyone has a kindly feeling toward the men that "go down to the sea in ships;" and there is not a taxpayer in the United States who would not welcome with pleasure any legislation that would tend to make their lot easier and their daily life upon the sea more attractive. But when it is sought to do this at a sacrifice of those stringent safeguards of discipline upon which the security of the ships, of their cargoes, and, above all, of their passengers, depends, it is time to call a halt and subject such remedial measures to very close and critical examination.

It is not any desire to humiliate the seaman or exalt the position and prerogative of the officer that has evolved, in the course of centuries, the strict laws which now obtain in the merchant marine against insubordination or desertion; yet we are compelled to admit that a candid and impartial study of the wording of this act leads us to the conclusion, not only that it will fail to benefit the seaman, but that it will greatly impair the efficiency of the crews and most seriously interfere with the safe and efficient working of the ship. Should this act become a law, the only punishment for desertion will be forfeiture of the effects the seaman leaves on board and of such wages as are due him. For neglecting to join his vessel or to proceed to sea, for absence without leave within 24 hours of the vessel's sailing, or for absence at any time without leave, he is to be punished merely by forfeiture from his wages of not more than two days' pay. For quitting the vessel without leave before she is placed in security, he is to lose not more than one month's pay. For willful disobedience to any lawful command at sea, he may be placed in irons until such disobedience shall cease, and on arrival in port, he is to lose not more than four days' pay. And so the curtailment of discipline goes all through the bill, with the result that no penalty is provided for assaulting any of the officers except the captain or mate.

Another requirement is that the seaman is to be paid one half the wages due to him at every port where the vessel shall load, etc. To this it is objected by the owners that such procedure has a tendency to impair the efficiency of the seaman, who spends his money freely when he reaches shore, and that it thereby encourages him to desert and squander his earnings as fast as they accumulate.

The bill proposes to place in the hands of the crew alone the power to force at any time the creation of a commission from among the seamen to inquire into the condition of the ship. That this is unwise from the standpoint of safety is shown by the fact that such a complaint can be brought forward at any time and without any foundation, merely as gratification of personal spite or as a threat to secure the enforcement of demands. If any such stipulation is made, the commission should include at least one of the officers.

Another stipulation, to the effect that 75 per cent of the crew must be able to understand any order given by the officers, is aimed directly against the employment of Asiatic crews, and if it be enforced, it will drive the few American ships that are now plying on the Pacific coast out of business, and will discourage ships of foreign powers from visiting American ports.

The most impracticable clause of the bill, however, is that which in addition to calling for sufficient lifeboats (liferafts are not allowed) to accommodate every one on board, demands that there shall be two able seamen for every lifeboat, by "able seaman" meaning one who has seen three years on deck at sea or on the Great Lakes. This would mean the employment of a large number of deckhands who would be idle most of their time and would see practically no active service aboard ship, except in rare cases of emergency. How pernicious is this requirement will be seen, when it is understood that the firemen, stewards, storekeepers and other members of the crew, who form the greater part of the personnel on board a modern steamer, will be excluded by law from lifeboat service.

Could anything be more fatuous? As matters now stand, some of the finest boat crews are to be found among the firemen and stewards. Capt. Rostron, who was instrumental in rescuing the "Titanic" survivors, stated recently to a member of our editorial staff that it was not an uncommon thing for a boat manned by stewards to win in the boat-racing competitions, and that the stewards of a certain ship hold a silver cup won in competition against seamen.

There are many clauses in this bill with which we are heartily in sympathy, such for instance as those which provide for each member of the crew a certain amount of cubical space, a separate berth, and living accommodations that are properly lighted, heated and ventilated; those which provide for an adequate and specified supply of good food, and sufficient drinking and bathing water; but it is most sincerely to be hoped that the committee in the House of Representatives will so far amend this bill as to eliminate all those provisions which tend to relax discipline, encourage desertion, and place unnecessary burdens upon our already depleted and rapidly declining Merchant Marine.

Descents into the Crater of Vesuvius

PROF. MALLADRA of the Royal Vesuvian Observatory, whose first descent into the crater of Vesuvius was described in the SCIENTIFIC AMERICAN of June 15th, 1912, has since twice repeated his dangerous feat, viz., on September 9th and October 23rd, 1913. The former of the two recent descents, according to a note in the *Geographische Zeitschrift*, was made for the purpose of examining a new funnel-shaped vent, over 500 feet in diameter and 230 feet deep, which appeared in the floor of the crater on May 10th. Streams of gas flow from this vent, and since last July it has also glowed with incandescent lava.

Accompanied by Prof. Stortz and Paul Jacobi of Munich, Malladra first descended the southeast wall of the main crater, a climb of an hour and a half. The floor, lying nearly a thousand feet below the rim of the crater, is a broad level surface, strewn with blocks of lava, and containing numerous fumaroles. The party then made the perilous descent into the new vent, where they remained for an hour, in spite of the terrific heat and stifling gases; taking photographs, making measurements, and collecting specimens of ejected material. An examination of the last showed that the volcano has entered a so-called "Hawaiian stage"; i. e., it is ejecting liquid lava of very high temperature. Attempts to measure the temperature of the lava with thermometric apparatus suspended by a wire rope failed, the thermometer and part of the rope being engulfed in the lava. The remnant of the rope was found to be strongly oxidized. In the fumaroles of the main crater temperatures of 330 deg. Cent. were measured. The whole time spent in the crater was 8 hours.

On December 21st, Mr. Frederick Burlingham, accompanied by two Italian assistants, descended into the crater and made a series of cinematograph pictures, which have since been exhibited in London. These include views of the crater floor, of the rim of the new vent, and, finally, remarkable pictures taken at the bottom of the vent, where the party remained for 20 minutes. The pool of boiling lava, known as "Hell Pit," was photographed at close range. Danger from falling rocks and poisonous fumes, as well as the intense heat both of the air and of the rocks over which the party had to climb, make this one of the notable feats in the history of moving picture photography, comparable to the cinematographic record of an ascent of the Matterhorn secured through Mr. Burlingham's efforts last year.

The Growth of the Lake Survey

THE Lake Survey is described at length in the last report of the Chief of Engineers, United States Army. As early as 1816 local surveys of the Great Lakes were made by engineer officers, but the "Lake Survey" (known officially as the Survey of the Northern and Northwestern Lakes) as a systematic work was inaugurated in 1841. The field work has continued ever since except during the years 1882-1889, while there has been no cessation at any time in the correction, printing, sale and issue of charts. The sundry civil act of March 4th, 1911, provided that the work of the survey be extended to include the lakes and other navigable waters embraced in the navigation system of the "New York canals," and the act of June 23rd, 1913, further extended the work to include Lake Champlain. During the seventy-two years of its existence the survey has cost the Government nearly $5,000,000. The water area charted is about 95,000 square miles, of which about two thirds is on the American side of the international boundary. The shore line amounts to 8,345 miles, of which about 4,700 miles is on the American side. These figures become more significant when it is added that the total shore line of the Atlantic, Pacific, and Gulf coasts of the United States, excluding Alaska and all islands, is only 5,705 miles. The fact that about 95 per cent of the commerce on the lakes is under the American flag explains the inclusion of Canadian waters and shores in the American survey. The present series of photo-lithographed charts in colors dates from 1895. In 1913 the charts in force numbered 120, and the total number of copies issued since the beginning of the work had reached nearly half a million. Prior to 1890 one full set of charts was issued free to each United States registered vessel, but since that time all charts have been sold at a price covering only the cost of paper and printing. Annual bulletins and supplements contain information too voluminous to be included on the charts. The main office of this important service, which is one of the striking examples of the many essentially humanitarian activities carried on by our War Department, is at Detroit.

Engineering

Naval Radio-Station in San Diego.—The board of naval officers which has been investigating the site for the location of a high-power radio-station on the California coast, has selected a site on La Chollas Heights, about four miles east of the city limits of San Diego, and eleven miles from the Pacific coast. It embraces some 74 acres which lie at an elevation of 450 feet above sea level.

To Prevent Settlement of St. Paul's Cathedral.—A Mr. Miller has submitted to *The Builder* a suggestion for preventing further settlement of St. Paul's Cathredal. He believes the settlement is due to the drying out of the subsoil, and he proposes to remedy this by sinking a cofferdam wall entirely around the cathedral to a sufficient depth, and then by means of perforated water piping giving the inclosed area sufficient saturation to bring it up to its original consistency and bearing power.

Naval Officers to Study at War College.—Henceforth naval officers are to be ordered to the War College for a course of twelve months study. This marks a new era in the administration of the college. Each new class will be associated with a class that has had six months' experience, thus handing down the spirit and traditions of the college from class to class. In our opinion, the instruction here received will exceed in importance that which these same officers received years ago at Annapolis.

One Million Dollars Saved on Projectiles.—There has been a remarkable drop in the prices asked for projectiles by the various American manufacturers. Thus, the Crucible Steel Company of America asks $378,000 for 1,200 fourteen-inch armor-piercing projectiles. Last year's price for an order of this kind would have been $600,000. For 2,400 fourteen-inch projectiles, the Bethlehem Steel Company has cut its price from $1,200,000 in 1912 to $768,000 in 1913. The total saving on this year's order for projectiles is over one million dollars.

Suggestion for Saving Submarines.—A correspondent has furnished us with a description of his plans for saving the crew of a submarine that has sunk. It consists of an annular tank carried in a depression around the hatch of the submarine, to which is connected a coil of air hose. The tank can be released from the inside of the submarine, when it will rise to the surface and provide a means of supplying air to the crew and even of forcing down sufficient air to expel the water in case of damage to the hull, thereby enabling the submarine to be floated to the surface.

The Toll of the Sea.—In spite of better construction, more accurate charts and the continued improvement of lighthouse service, the sea continues to take an enormous annual toll in property and lives of those that traverse its surface. The marine disasters of 1913 amounted in money value to $35,000,000 in British-insured ships and cargoes that were totally lost. On the Great Lakes alone, the storm of last November rolled up a loss of $4,700,000. The above figures do not include damages to ships and cargoes that were not total losses; for these, the damages amount to over $30,000,000.

Weight of Locomotive "Puffing Billy."—The Board of Education, South Kensington Museum, London, has kindly furnished the following additional particulars regarding the celebrated locomotive "Puffing Billy," whose centenary occurred last year. The weight of the engine in working order was 8 tons 6 hundredweight, and of the tender 4 tons 6 hundredweight, making a total weight of engine and tender in working order of 12 tons 12 hundredweight. At a speed of five miles an hour, "Puffing Billy" was able to haul about 50 tons, but on occasions as much as 70 tons was hauled at a reduced speed.

Emergency Rudder to Avoid Collision.—We have received from Mr. George E. Bell of Cambridge, Mass., a sketch of a design for rudders to be used in the event of a threatened collision. It consists of two rudders, attached one on each side of the ship just below the water line, which normally lie flush with the side of the ship, and are provided with operating mechanism controlled from the bridge, whereby one or other can be thrown out to produce a powerful turning effect upon the ship. The controlling gear is such that the rudder can be moved out gradually through its maximum arc of turning, and sudden violent wrenching effects upon the rudder or its attachments to the ship prevented.

Another "Tallest" Building.—Plans have recently been filed with the Bureau of Buildings, this city, for an office building which, on its completion, will be the tallest in the world, reaching a maximum height of 894 feet 6 inches. The structure is proposed to be built on the block bounded by Broadway, Eighth Avenue, 57th and 58th streets. It will be fifty-one stories high, with basement and sub-basement. The façade will be of brick and light stone, and the design will be ornamental, following broadly the Gothic style. The building is to be built by the Pan-American State Association and the tower is to be surmounted by an allegorical figure representing the Association. The estimated cost is $12,500,000.

Electricity

Low-priced Electric Automobile.—It has been reliably reported that Mr. Henry Ford, manufacturer of the well-known low-priced gasoline automobile, is soon to enter the electric field, producing an electric automobile that may sell as low as $600. According to the plans that have been given out, the car will weigh 1,100 pounds, of which 405 pounds will be taken up by the storage battery equipment. The storage battery will be of the Edison nickel-iron type and the machine will have a radius of 100 miles per charge.

Electric Operation of Turret Guns.—The recent announcement that the British dreadnought "Invincible" is to have its gun-controlling mechanism changed from electric to hydraulic gear has met with much criticism among electrical engineers in Great Britain. It is claimed that the change signifies no superiority of the hydraulic system, but is due chiefly to friction between two departments, one of which controls the guns and the other the electrical equipment. In our own navy, the guns are operated by electric motors under control of hydraulic variable speed gears.

Heating Churches by Electricity.—Electric power companies are constantly searching for outlets for their power during the off-peak load period. *The Electrical Review and Western Electrician* suggests that the heating of churches comes under this class. In some parts of Switzerland and in Germany, churches are electrically heated, and recently a church in Christiania, Norway, has been fitted with an electric heating system, current being supplied at the exceedingly low rate of 0.8 cent per kilowatt hour. In this country it would probably be impossible, and certainly unnecessary, to furnish the power at so low a rate. Nevertheless, current could be supplied to the churches with profit at far below the customary rate in order to raise the output of electricity during the off-peak hours.

The Electric Mail Wagons recently adopted by the Vienna postal authorities, says the *Electrician* (London), have been subjected to a test of 312,500 car miles, lasting over 15 months. At the conclusion of this test, 45 vans of 2½ tons capacity were placed in service. Lead batteries of 42 cells are used having a capacity of 300 ampere-hours at a 5-hour rate, and a maximum charging rate of 60 amperes. The weight of these batteries is 18 hundredweight, with a normal range of 35 kilometers (22 miles) fully loaded. The motors used have a maximum output of 15 horse-power, are series wound and are housed in the wheels. The garage is partitioned for each vehicle, and provided in its basement with charging equipment. For handling the batteries an elevator rises beneath the vans, so that the discharged batteries may be unshipped and replaced by fully charged ones. The weight of each van fully loaded is 6,300 kilogrammes (6½ tons).

John Walker Wilkins, a pioneer of telegraphy in England, and the first man in the world to transmit telegraphic signals through space, died at Kingston-on-Thames on December 18th last, at the age of 86. When Mr. Wilkins was only 18 years of age, he was appointed superintendent of the Northampton and Petersborough telegraphs. And a few months later, he became the general superintendent of the lines that had been extended from Hull to Fleetwood and from Rugby to Newcastle. It was at this time that he experimented with induction telegraphy and succeeded in sending messages from one wire to another 120 feet away. To be sure, his system had nothing to do with wireless telegraphy, as we now know it, in which Hertzian waves are employed. Nevertheless, it does mark the first attempt at space telegraphy. Unfortunately, Mr. Wilkins dropped his work in telegraphy shortly after visiting this country in 1851, and took up engineering work instead.

Automatic Isolated Lighting Plant.—A new automatic charging panel has recently been put upon the market for use with isolated storage battery plants. It is arranged to deliver the charge through the battery at a tapering rate, heavy at the start and gradually diminishing to a low rate at the finish, so as to avoid overheating, injurious gassing or spraying, and injury to the battery's plate. At the same time, a practically constant voltage is maintained on the external circuit during charging, so as not to disturb the lighting system. The entire operation is completely automatic, the gas engine stopping and disconnecting the dynamo and connecting the lamp circuit direct to the battery when the charge is completed. The only non-automatic feature, and this is intentionally retained, is that the system must be started by hand when it is time to re-charge, but warning of this time is given by a red lamp or an electric bell alarm. The reason the starting is not rendered automatic is because it is considered essential that the operator go in person to the plant and make sure that the engine is properly oiled and supplied with the requisite gasoline before it is started. To start the system, it is merely necessary to throw a switch when the battery current, acting upon the dynamo as a motor, cranks the engine until it runs of its own power.

Science

An Investigation of the Spanish Dialects of Mexico has been undertaken by Dr. Rudolf Wagner, who will also collect folklore from both the Indian and the Spanish-speaking populations of that country.

The Audubon Societies expended $80,000 in bird protection in this country last year. Junior Audubon classes, organized under the direction of the National Association of Audubon Societies, have attained a membership of 52,000.

Benjamin Osgood Peirce, Hollis Professor of Mathematics and Natural Philosophy in Harvard College, died recently in Cambridge, Mass. He was born at Beverly, Mass., February 11, 1854, and was a son of Benjamin Osgood Peirce. He received the degree of A. B. at Harvard in 1876; Ph.D. at the University of Leipzig. From 1879 to 1880 he was a student in Berlin. In 1881 he became instructor in mathematics; Assistant Professor of Mathematics and Physics, 1884 to 1888, when he became Hollis Professor at Harvard. Prof. Peirce was the author of "Theory of the Newtonian Potential Function," "Table of Integrals," and "Experiments in Magnetism."

The Big Game of British East Africa, outside of the three preserves of the colony, is rapidly vanishing, and, according to W. T. Hornaday, "is absolutely certain to disappear in about one fourth the time that it took South Africa to accomplish the same result." Hornaday points out that the present legal bag limit is ruinously extravagant; for $250 any man may buy the right to kill 300 head of hoofed and horned animals of 44 species, not counting carnivorous animals that may also be killed. Thus the richest big-game fauna of any one spot in the world, which nature has been several million years in developing and placing there, seems likely to be wiped out by man within the next fifteen years.

Medical Education in the United States.—In an interesting report on this subject by Dr. Graham Lusk, published in *Science*, it is stated that in spite of the campaign for higher standards waged by the Council on Medical Education of the American Medical Association and other agencies, there are still four States in which it is not necessary that an applicant for medical license be a graduate of a reputable medical college, while in the year 1912 the authorities of Tennessee presented the spectacle of licensing 175 persons who were not graduates of any medical school whatever. As to the medical schools themselves, however, it is gratifying to learn that quality has improved at the expense of quantity. The number of schools in this country has diminished from 166 to 110 since 1904.

The Sea Route to Arctic Siberia.—The commercial possibilities of the route from Europe to the Arctic coast of Siberia *via* Kara Sea were again signally demonstrated last season, when the steamer "Correct," commanded by an Englishman, and having on board Dr. Fridtjof Nansen and two Russian officials, accomplished the voyage to the Yenisei and return, carrying profitable cargoes both ways. The voyage from Tromsö, Norway, to the Yenisei took 22 days, but the return between the same points was made in 10 days. A lecture on this voyage and the lessons it teaches will be delivered by Dr. Nansen before the Imperial Russian Geographical Society, at St. Petersburg. When it is remembered that the Yenisei River is one of the greatest natural highways of Asia (it is navigable for 1,840 miles from its mouth), and drains a region of immense mineral wealth, the importance of the fact that for about two months in the year navigation between its mouth and the ports of Europe is possible, will be evident.

The "Vineric" System is one of several recent developments of wine-making described in a valuable paper by Messrs. F. de Castella and W. P. Wilkinson presented at the last meeting of the Australasian Association for the Advancement of Science. It consists in the sterilization of the grapes, as soon as they are vintaged and crushed, with a dose of sulphurous acid to render fermentation impossible. They can then be stored until such time as suits the wine-maker and fermented at leisure, after the removal of the sulphurous acid by the operation known as "desulphiting," under most suitable conditions as to temperature and cellar care. Thus wine-making is put on somewhat the same footing as brewing; i. e., the raw material may be harvested as rapidly as desired, but its transformation into wine is carried out as deliberately as the manufacture of beer. Evenness of type and reduction in the cost of handling are some of the advantages of this process. Desulphiting is performed in a column analogous to the rectifying column of a still, in which the bubbling of air through the liquid, under reduced pressure and at a temperature of about 70 deg. Cent. (158 deg. Fahr.) removes practically the whole of the sulphurous acid. Several important "vineries" have been established in Europe and Algeria, and it is expected that the use of the new process will be enormously extended within the next few years. One of its promising applications is in the manufacture of unfermented grape juice. The main credit for this innovation in wine-making is due to Barbet, the well-known authority on distillery equipment.

The Licorice Trade of Syria

The Curious Story of a Plant that is a Useless Weed in its Own Country and a Valuable Herb Abroad

By John D. Whiting

Factory and warehouse at Alexandretta where licorice root is pressed.

A great pile of licorice root at Aleppo.

WHERE and how is licorice obtained? What are the proportions of the trade that produces it?

A very considerable part of the licorice root used in America is from marshy plains in Turkey and Russia.

This root is not cultivated, but grows wild in large quantities, generally in great stretches of open ground where the soil is more or less damp. It is regarded as a serious pest and greatly interferes with cultivation. Much land is abandoned to it, while some is plowed and sown notwithstanding its presence. It is a perennial herb of the genus *Glycyrrhiza* of the bean family. The licorice of commerce is obtained by evaporating an infusion of the sliced roots. This solidified substance is used for flavoring confectionery and beer as well as entering into the make-up of most of the brands of tobacco.

The growth above ground of the plant is about two feet, while the root is about as deep beneath the soil. The land in Syria from which the root is gathered is leased from the owners, the condition, as far as lands that are cultivated, being that the digging out of the licorice root must cease when the time comes for planting the cereal crops. The result is, as far as these lands are concerned, that the getting out of the roots must be done quickly as soon as the rains, which begin in October generally, have somewhat moistened the ground, as it would be very difficult to do the digging in the long dry summer.

The collecting stations of Syria are at Antioch, Aleppo, Bagdad and Damascus. The company mentioned has other stations in the Smyrna district as well as in parts of Russia. Around the main stations are smaller depots located in the midst of the fields, each in charge of a man whose duty is to receive and guard the licorice as brought in by the natives. These latter dig out the root with the primitive picks such as were doubtless used from the time of Abraham, and carry it on donkeys and otherwise as they can to the local station where it is weighed, as the payment is according to the quantity by weight, and they receive a receipt for the amount delivered. Traveling cashiers mounted on horses make the rounds of the depots, collecting and paying for the receipts.

The root is piled in great stacks, and when the digging season is over a watchman takes charge, and the root remains thus stacked through the winter and the following summer, when it becomes quite dry and is ready for transportation to the coast. Great care has to be exercised that the stacks do not heat or mildew.

One of the greatest questions involved is that of transportation. All the root from Aleppo and Antioch has to be carried to the seaport of Alexandretta. The largest contractors are Bedouin from near Hamma. These receive large sums in advance to enable them to buy camels, and it is said by the members of the firm conducting the business, that these Bedouin are always faithful in carrying out their contracts. The root is packed into huge bags, two of which form a camel load. The transportation is also paid for by weight, and the weight is carefully checked when finally delivered. These Bedouin are found to be quite honest and faithfully deliver the quantity of root intrusted to them; but in their eyes the root is of little or no value, and they have no compunctions about making a little fire of the dry roots with which to bake a loaf of bread. This is the point that has to be guarded in the matter of weight.

Warehouse and hydraulic press for licorice root at Alexandretta.

Piles and bales of licorice root at Aleppo.

At the port of Alexandretta are several large presses which are located on the seashore.

Here, as our illustration shows, are seen immense stacks of the licorice. For shipment it is pressed into convenient sized bales by hydraulic presses, a couple of bands of strap iron being sufficient to hold one of the tightly compressed bales together. The bales are stored in large warehouses until shipped.

The Aleppo district gathers and exports on an average an aggregate of 8,000 tons annually of dry licorice root, while Bagdad yields about 6,000 tons, Antioch 4,000 tons, and Damascus 500 tons. All these stations are worked by the company itself except Damascus, whence it is supplied to them by native contractors. At Alexandretta one press is owned and operated by a native firm, but they sell their entire output on the ground to the American company mentioned.

At Smyrna a small quantity of the root is extracted for the European trade, and all the rest of this great annual harvest of root is shipped in a raw state to the United States.

This industry is a great blessing to this comparatively poor region, employing as it does many hundreds of natives and bringing cash into the country instead of taking it out, as so many foreign enterprises do.

The process by which the licorice is extracted from the root has already been spoken of, and it is interesting to add that after that is completed the pulp is pressed, with American ingenuity, into boards which are used in cabinet work and which are said to make up into novel and handsome articles.

Radiotelegraphy in Siberia.—The remote corners of the Russian Empire are rapidly being connected up with the world by wireless. During the year 1914 it is intended to install stations at Markovo, on the Anadyr River; Sredne-Kolymsk, on the Kolyma River; Tigil, Kamchatka; and Alexandrovsk, Sakhalin.

Foolproofing the Motor Truck

Eliminating the Personal Element in the Operation of the Commercial Vehicle

By S. H. Whiting

ALTHOUGH the motor truck has already reached the stage of perfection attained some time ago by the pleasure car, the designer of the former is confronted with far more serious problems than are to be found in the construction of automobiles of the runabout or touring type. The reason for this difference is not difficult to find. The business man purchasing a pleasure car looks upon his investment as more or less of a luxury and charges it to recreation and enjoyment. The motor truck, on the other hand, is purely a *business* proposition, and as such, must prove its ability to bring a greater return on the investment than can the horse system which it replaces. The result of this condition is that the pleasure car receives better care and is handled by more competent persons than is the truck. A $25 or $30 a week chauffeur is hired to drive and care for the pleasure car, or the owner gives it his personal attention. This salary for a truck driver, on the other hand, would be considered to be rank extravagance, and the tendency is to break in horse drivers as truck operators at a very slight increase in the $12 or $14 wages that they may have been receiving previously.

Naturally the truck manufacturers have had to consider these conditions, and the fact that the personal element has received deep thought is evidenced by the "foolproof" constructions and devices now found on many commercial vehicles. It is not to be expected that automatic steering and stopping devices will be installed, for every driver is supposed to possess the average amount of human intelligence, but the operation of interacting mechanical movements has been so designed that the manipulation of a lever at the improper time or in the wrong direction can do no more than to stall the motor. This effect, in part, is obtained by constructing shafts, joints, and bearings of sufficient strength to withstand any strain to which they can possibly be subjected, but this is supplemented by design of a finer order that materially reduces the probability of imparting such strains to the parts in question.

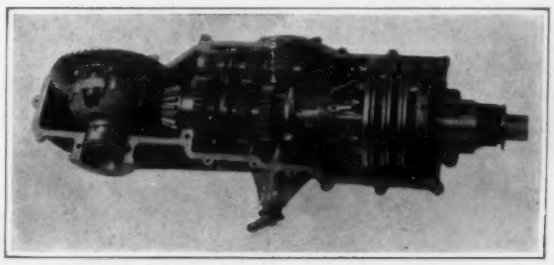
The design of clutches and transmission systems is illustrative of this point. Disk clutches or those of the cone type with cork inserts or small springs placed under the leather serve to prevent the sudden application of power to the rear driving mechanism—even though the driver's foot may slip from the clutch pedal or he may willfully release the pressure too quickly. The application of the load may be sufficiently sudden to stall the motor, but the owner may rest assured that there is no danger of a broken gear tooth or a sheared shaft key. The friction surfaces of the clutches, which are subjected to a greater amount of wear than any other portion of the car, are especially designed for such "punishment," and many instances can be cited in which trucks have been given hard usage for sixty and seventy thousand miles without the renewal of a clutch surface.

The planetary transmission has long been noted for its "foolproof" qualities, for the fact that all of the gears are in mesh all of the time precludes the possibility of stripped teeth when the change from one speed ratio to another is made suddenly without releasing the clutch. The limitations of the planetary transmission, however, to those of the two-speed type, has caused their gradual disappearance from use on heavy trucks, and to-day we find the three- and four-speed sliding gear transmissions occupying the center of the stage. These are of the same type as are used on pleasure cars, but their wide faces and general heavy construction make them better adapted to transmitting power to the greater loads at the rear wheels. While these gears are made of special steels and are subjected to special heat-treatment, all manufacturers do not think that this is sufficient protection against stripping or chipping when a careless or ignorant driver attempts to change speeds without first disengaging the clutch, and accordingly several devices to prevent this clashing of gears are in use on several makes of trucks. Probably the simplest of such devices is one in which the transmission lever is automatically locked whenever the clutch is engaged. The gears, therefore, cannot be shifted until the clutch pedal is depressed. This mechanism consists of a quadrant that is swung by the transmission lever. In the periphery of this quadrant are cut notches corresponding to the position of the transmission lever when set at the various speeds, and by means of a latch released by the clutch pedal when the latter is depressed, the transmission lever is locked except when conditions are proper for the gear change. Other "safety" systems consist of an individual disk clutch for each gear ratio, and the "dog clutch" and spring type. In the former, the gears are in mesh at all times, although they are mounted upon the main shaft and countershaft in the same manner as in the sliding gear transmission. It is the clutches that are operated to obtain the various gear ratios, however, and these are so arranged that but one can be engaged at a time. In the other type of transmission mentioned above, a small handle located under the steering wheel is used to apply spring tension to the gear that it is desired to shift, but by means of an ingenious arrangement of cams and dog clutches, this gear is prevented from moving until the clutch is released.

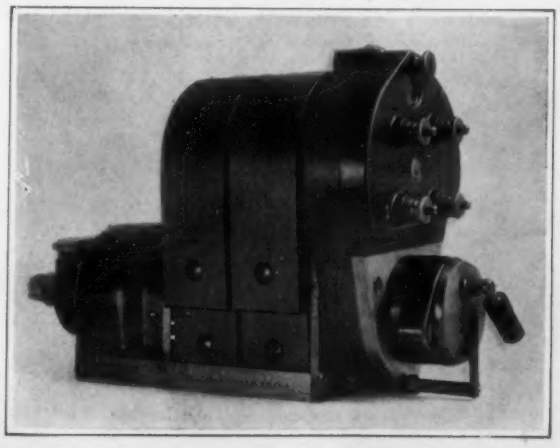
Spark lever inconveniently located to prevent tampering.

While these types of transmissions are not necessarily in general use, they are mentioned as examples of the thought that has been put upon "foolproof" design in order to eliminate, as far as possible, that uncertain personal equation that always enters into the success or failure of a motor truck installation.

But while considerable time and thought have been put upon the transmissions and "running gears" of trucks, the problem here is only one of mechanical strength. The motor, however, is susceptible to a variety of conditions that affect its efficiency, length of satisfactory service, and power output. It is well known by every motorist, for example, that to obtain the best results from his engine, the spark lever should not necessarily be operated *only* in conjunction with the throttle, but that the speed at which the engine is operating should have an important bearing on the time at which the spark should occur. But to obtain that proper position in which throttle opening and engine speed are taken into consideration, the driver must have had considerable experience, and must "know" his motor thoroughly. In fact, it is better that the spark should be left in a fixed position than that it should be unduly advanced at slow motor speeds or fully retarded at wide open throttle. Because of the difficulty of obtaining truck chauffeurs who will pay proper attention to these important details of motor operation, some of the truck companies produce machines on which no spark lever is provided, the contention being that if the spark is set to occur at the top of the stroke, no harm can be done, and the loss in efficiency that would be entailed at high speeds is negligible when compared with the damage that might ensue through improper operation of the spark.



Gear ratios varied by means of clutches.



Magneto with automatic spark control.

On other trucks, the makers have not taken quite so radical a step, but have assumed that some sort of spark control is advisable. They have consequently located the spark control lever on the dash board where it may be reached if the driver leans forward, the theory being that, if it is not placed close at hand on the steering wheel, the spark will not be advanced or retarded unnecessarily. But this desire to remove the spark control lever from the possibility of interference by incompetent hands has resulted in the development of magnetos provided with automatic spark regulation in which the ignition in each cylinder is controlled to occur in accordance with the speed at which the engine is running.

It is generally admitted that the two conditions of operation which do more to injure a motor truck than any other practices are overloading and speeding. Unfortunately, no practical device has as yet been developed that will automatically prevent the former evil, but efficient governors have been devised that effectively regulate the speed of the motor. These are either of the centrifugal or hydraulic type, and generally operate on the throttle. They are so arranged that their operation or adjustment cannot be interfered with by an unprincipled driver without ruining the entire mechanism. Such a device not only controls the rate of travel of the truck, but regulates the speed of the engine and thus prevents that "racing" of the motor that is so conducive to wear and loose bearings, and yet that nevertheless seems to be the delight of many a so-called "expert" driver.

Because it is assumed that under certain conditions—such as when running under low gear, for instance—it is often advisable to increase the revolutions of the motor beyond the point at which the maximum speed on high gear would be obtained, some types of governors are placed on the transmission shaft. Such governors control only the speed of the car, but the owner of the vehicle may know that the speed at which his truck can carry its normal load efficiently, is not being exceeded by even the most careless driver.

Of course, on any mechanism subjected to the intense heat and great strains of the automobile motor, sufficient and efficient lubrication is of prime importance. An engine cannot run without fuel, but no harm to the machine itself will be incurred from a lack of gasoline. On the other hand, an engine can run for a short period without oil, but more harm may be done in this time than would result from thousands of miles of use under the proper conditions. And yet, for all its importance, the lubrication of the motor is almost the last point about which the motor truck driver need concern himself. With the unit power plants now coming into use, in which motor crank shaft and clutch—and sometimes the transmission, as well—are housed in the one aluminium crank case and extension, one lubricating system supplies the entire motor and allied parts. Oil in the proper amount is supplied to the necessary parts whenever the motor is run—and it is only necessary for the driver to fill the oil reservoir and gear cases at stated intervals. Points such as spring shackles,

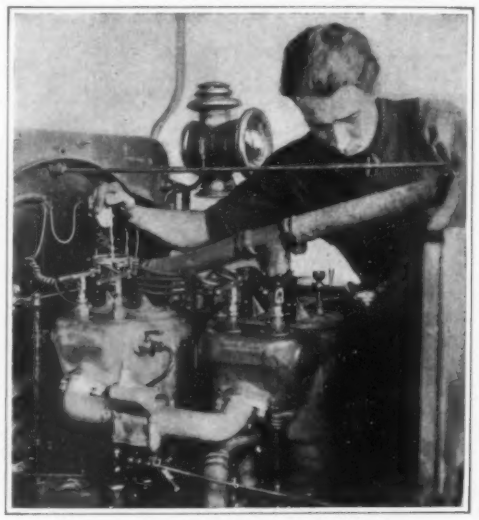
(Continued on page 108.)

Reassembling the motor.

The Problem of the Second-hand Motor Truck

How Used Machines Are Thoroughly Overhauled and Reconstructed in the Builders' Local Service Stations

By John S. Hardwhite

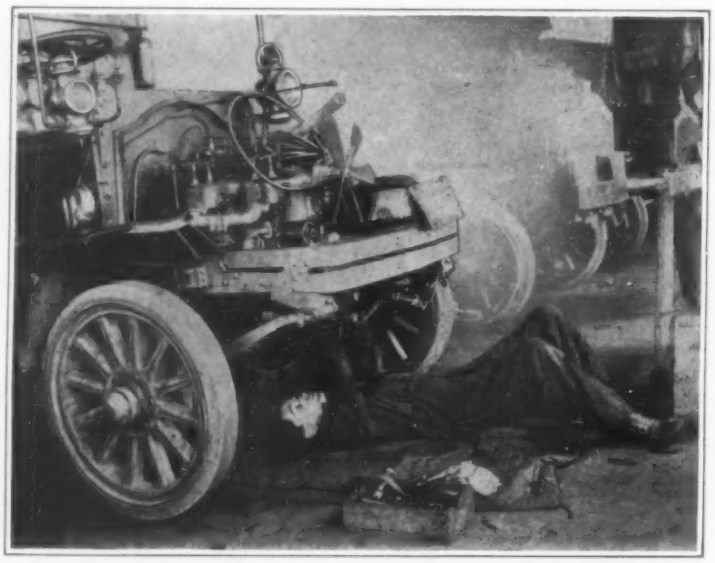


Testing the speed of the motor.

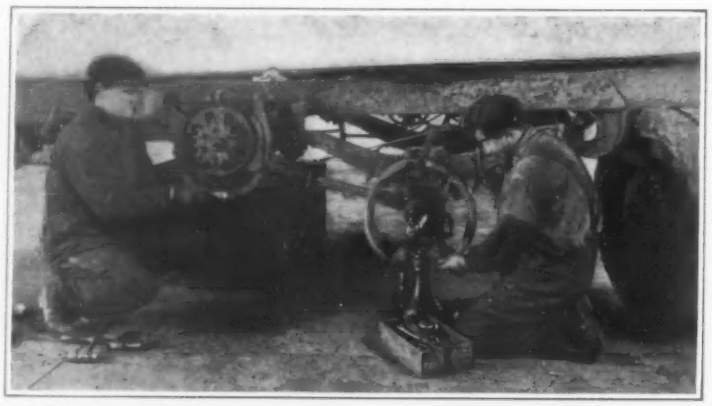
"SECOND-HAND" is a term carefully avoided by those concerns and individuals who make a business of buying and selling trucks or pleasure cars that probably have "seen better days." Whether it is thought that there is more or less ignominy attached to the purchase of a second-hand commercial vehicle that is now made in new models in such styles and at such prices as to fit the requirements and pocket book of practically every business man, or whether the term "second-hand" conveys the general meaning of "cast-off" or "discarded," matters not, but if the prospective purchaser of such a truck would be diplomatic, he should refer only to the "used" machine, or "rebuilt" truck.

It is but natural that there should be a large number of such vehicles on the market; a man doing business in a small way may feel the need of a one-, three-, or five-ton truck, but may not have the ready cash to invest in such a machine when new; this demand is more than supplied by the number of trucks that are taken in exchange for new ones by the manufacturers, and by those that fall into the hands of the used car brokers. But the pitfalls besetting the path of the unwary purchaser of a used machine are many, and the danger that the supposed bargain will become the most highly gilded of gold bricks is great. A famous name-plate may mean nothing on a second-hand car; the reputation of the manufacturer for high-class design and conscientious workmanship may count for naught; a used—or misused, rather—truck becomes a hybrid, an orphan, with no parent manufacturer to stand sponsor for it or for its performance. A truck possessing the reputation of using well-fitted and heavy bearings and of claiming more than its share of high-class and expensive steels may be absolutely ruined in a short time if it falls into the hands of an ignorant or careless driver or owner; while a truck boasting only a mediocre reputation when new, may, by proper handling and frequent inspection and repairs, be worth double the price of the first truck that had been so sadly misused.

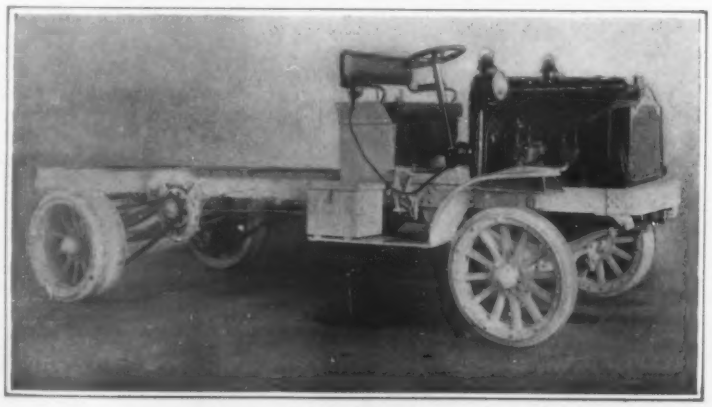
Therefore it behooves the prospective purchaser who is a firm friend of a car or truck of a certain make to pick his way carefully before he decides on a second-hand machine of the same brand. To be sure, if the truck in question is sold by the "used car department" of its original manufacturer, and if, as is usual under such conditions, it has been carefully overhauled and rebuilt, and is sold with a six months' or a year's guarantee, it may prove a most excellent bargain and profitable investment. Many reliable manufacturers take used trucks of their own make in exchange, to apply as a partial payment on the sale of a new one, while others make a fairly liberal allowance for a truck of any brand. As chickens come home to roost, so do such trucks taken in exchange, eventually reach the parent factory in which they were born. There they again pass through the hands of their builders, are rejuvenated, as it were, and become safe and substantial investments for the man who is looking for a reliable truck at a lower price than the cost of a new one. A motor truck is an assemblage of hidden parts; the vitals of the machine are covered from the eye; several hours of expert dismounting may be required before the condition of an important bearing can be accurately determined; and the entire machine must be thoroughly overhauled before its actual value as a transportation vehicle can be ascertained. For the prospective owner to undertake this overhauling in order to determine the actual value of the truck, is impracticable; for him to employ an expert to undertake this work would prove prohibitively expensive. Therefore it is evident that his second-hand truck should be purchased only from an individual or company that is not only competent to overhaul and repair the vehicle, but whose word and guarantee are implicitly to be relied on. There are concerns doing a legitimate business in the rebuilding and sale of second-hand trucks, but their responsibility as to its performance replaces that of the original manufacturer, and their status should therefore be thoroughly investigated.



Dismantling the motor of a second-hand car.



Investigating the rear-end construction.



The chassis rebuilt and ready for service.

It may be argued by the man experienced in the operation or management of motor trucks, that he can determine by the action of the vehicle, by its "feel," and by the sound of the various parts, whether it is in proper running condition or not. Such a man, however, overconfident of his own ability in this line, is the one most susceptible to trickery. "Doctoring" a badly-worn motor truck is simpler and more deceptive in its results than is "doping" a race horse. By the use of preparations of heavy grease, badly-worn gears in the transmission case and differential may be made to run as silently—for a while—as the most perfectly cut bevels and spurs of a new pleasure car; poorly-fitting pistons and rings may be concealed and made to hold compression in the cylinders for as long a time as would be required by the ordinary demonstration; loose or even burned-out bearings may be temporarily repaired by means of makeshifts; slipping clutches may be made to grip, and leaking radiators plugged to hold water. Even defective rear axles may be repaired without being replaced, the necessary part being brazed or welded on. All of these repairs, being but makeshifts, are temporary—very much so, in fact—but all serve to make the machine appear to be in satisfactory condition for the first thirty miles or more. Instances could be cited, for example, in which a machine ran satisfactorily for several weeks after purchase, until one day a rear wheel calmly rolled off, and it was found that the rear axle had been broken months before and that a repair had been effected by attempting to weld the pieces and endeavoring to cover the poor appearance of the job with solder or white metal that would fill the crevices.

It is expected that every truck bought directly from an irresponsible individual or concern will be found to have been treated in this manner. Some trucks are sold with the frank understanding that

no overhauling, inspection, or repairs whatsoever have been done. The conditions of such trucks should be investigated carefully, but the purchaser or his agent has the advantage in this case of knowing that what trouble exists will probably be manifested immediately in the operation of the machine.

It is evident from the foregoing that the value of a second-hand truck lies in the reputation and reliability of the previous owner, rather than its former connection with a factory that may have stood for all that is best in truck construction. That there are "tricks in all trades" has never been better exemplified than in the case of the second-hand truck. However, it should be remembered that it is manifestly unfair to assume that there are "tricks in all trucks."

International Conference on Safety of Life at Sea

THE International Conference on Safety of Life at Sea, which has been meeting in London, has signed the seventy-four articles in the convention.

Its main points were summarized by Lord Mersey, chairman of the Conference, as follows:

"An international service is to be established by the nations chiefly interested for the purpose of an ice patrol and ice observation as well as the destruction of derelicts in the North Atlantic. It is to be under the control of the United States. This service is to take over and continue the work done by the two vessels employed by the United States in 1912-13 in locating ice, in determining its limits to the south, the east and the west, and in keeping in touch with it as it moves southward in order that vessels may be kept informed by wireless telegraphy on its position.

"The service will also continue the ice observation work started last year by Great Britain, with the object of determining before the ice becomes a peril the fundamental conditions which govern its movement.

"The service will also continue the duty of dealing with dangerous derelicts east of a line drawn from Cape Sable to latitude 34 north, longitude 70 west. The waters to the west of this line will continue to be watched by the United States.

"The duty is also imposed on all shipmasters to report the presence of dangerous ice and derelicts, and a code has been prepared to facilitate this reporting.

"When ice is reported on or near the track a ship must proceed during the night at moderate speed or alter its course so as to clear the danger zone.

"The practice by which routes across the Atlantic are fixed by agreement between the steamship companies has been left unaltered and the governments undertake to impress all shipowners with the desirability of following as far as possible these routes.

"The effective lighting of boat decks is provided for by the convention and the carrying of Morse lamps is made compulsory.

"An international code for urgent and important signals has been adopted.

"It was impossible to revise the international collision regulations, as many States which were parties to those regulations were not represented at the Conference, but the convention binds the contracting States to bring about a revision of these regulations.

"Other points affecting the safety of navigation were found impossible of embodiment in definite articles, but the committee submitted resolutions embodying its views.

"On the question of construction of passenger steamships the convention provides that the existing arrangements shall be considered on their merits by the country to which each vessel belongs, with the view of providing increased safety where practicable and reasonable.

"The most difficult point this committee had to deal with was the division of ships into watertight compartments. The convention provides that the degree of safety should increase in a regular and continuous manner with the length of vessels, and that vessels shall be as efficiently subdivided as possible, having regard to the services for which they are intended. It is also explicitly stated that the requirements imposed by the convention are minimum requirements."

Among the most important subjects dealt with under the heading of construction Lord Mersey mentioned bulkheads for the prevention of the spread of fire, means of escape from watertight compartments, requirements as to the strength of bulkheads and decks, the reduction to the smallest number practicable of the openings in water-tight bulkheads, the restriction of the number of openings in the ship's outer skin, appliances for closing the same; requirements as to the fitting and extent of double bottoms, the periodical operation and inspection of water-tight doors, etc.

Lord Mersey referred to the compulsory entering in logs of drills and inspections and the requirements by the convention of adequate backing power and auxiliary steering apparatus.

The committee, he said, had recognized the importance of making a further study of these subjects and of the exchange of information.

The full text of the convention will be published next month, when we shall publish a complete digest.

A Radium Motor

The Possibilities of Radium as a Motive Power of the Future

By Major H. Bannerman-Phillips

THE demand for a type of motive power for ships, vehicles and aircraft which can be generated by machinery working in a circumscribed space, and which does not require large stores of fuel to be carried, and a numerous staff of engine hands, stokers, etc., has led to the invention of oil engines and internal combustion motors in recent times. This demand seems likely to be redoubled in future, while at the same time the ever-increasing consumption of coal and the products of petroleum points to the ultimate, though not perhaps imminent exhaustion of our terrestrial supply. Under these circumstances it is natural that students of matter and the general properties of matter as affected by energy or force should be called in to co-operate with the engineer and the chemist in order that fresh sources of energy may be tapped and the powers of nature persuaded to work in harness for the benefit of posterity.

It may be that radium, that rare element whose properties are being slowly revealed to the wondering comprehension of the present generation, may prove to be a source of that motive power which is so urgently sought for, and in a lecture at the Cancer Hospital in London on December 10th last, Mr. C. E. S. Phillips (F.R.S. Edin.), who is honorary physicist to the Electrical and Radio-therapeutic Department of that beneficent institution, foreshadowed ideas in this connection which may bear fruit in time to come. He pointed out that radium in solution always decomposes water in which it is placed, giving rise to an explosive mixture of gases—oxygen and hydrogen; and he proceeded to illustrate the working possibilities of such a mixture with a small apparatus of primitive nature for the benefit of his audience. Owing to the scarcity of radium, he used on this occasion other means of producing the required explosive mixture, but the audience understood that it could have been produced by the action of radium as indicated. The apparatus consisted of a flywheel in the shape of a small paper windmill with the sails going round horizontally, instead of vertically. Close to this stood a glass tube shaped like the letter Y with a short length of electric wire inserted in each of the upper arms of the letter. This represented the combustion chamber of the embryo motor of the future. Fastened to the lower end of the Y tube was another tube running to a glass bottle containing the explosive mixture of oxygen and hydrogen referred to above and supposed to have been produced from the decomposition of water by radium solution. The lecturer turned a tap which let the mixture pass from the bottle through the tube to the Y-shaped "combustion chamber," and switched on an electric current, producing sparks in the upper arms of the Y. The sparks caused a continuous series of miniature explosions of the gas mixture, and the puffs of wind which resulted therefrom acted on the arms of the paper windmill and blew it round. It was a pretty experiment and may have more behind it. If the decomposition of water is all that is required to furnish gas for a new form of explosion motor, it seems hardly necessary to use radium solution for the purpose; there are other and cheaper methods of attaining the same end, and it is well not to count upon a supply of a commodity which is certainly unattainable at present. The enormous cost of even a minute quantity of radium at the present moment places it quite outside the pale of practical mechanics, and this is not surprising when one considers that it took M. and Madame Curie two years to produce one gramme of chloride of radium, and that they "worked over" eight tons of pitchblende in the process.

The Competition for the Michelin Prize

THE Michelin prize for the aviator who has flown the greatest total distance during the year, is arousing keen interest among French aviators. Thus far the pilot Fourny stands at the head of the competitors. In twenty-two consecutive days he covered the remarkable distance of 15,989 kilometers. This performance certainly speaks well for his Renault 70 horse-power motor. For eight hours a day during this period of twenty-two days the motor made 1,800 revolutions a minute.

New Motor Service for Siberia.—It is proposed to establish an automobile mail and passenger service between the cities of Verkneaudinsk and Troitskosavsk in the Province of Transbaikale in Siberia, shortly. The length of the proposed route is approximately 215 versts (142 miles) and if the undertaking becomes a fact, combined passenger and express motor cars will make the trip once a day in either direction. The fare per passenger has been tentatively set at from 21 to 22 rubles, about $12.

Correspondence

[The editors are not responsible for statements made in the correspondence column. Anonymous communications cannot be considered, but the names of correspondents will be withheld when so desired.]

The Highest Tree in the World

To the Editor of the SCIENTIFIC AMERICAN:

In your issue of November 22nd, 1913, page 398, reference is made to the tall trees of Australia, implying that they exceeded the height of those found elsewhere. Having resided in Australia for ten years, and being fairly well acquainted with the trees there as also with the literature on the subject, it occurred to me that an explanation would not be out of place; hence, I am sending as an inclosure some extracts from Mr. Maiden's work, which is everywhere considered authoritative.

The Giant Trees of Australia.

The following is extracted from "The Forest Flora of New South Wales," by J. H. Maiden, Government botanist, page 162, in reply to the note which appeared in SCIENTIFIC AMERICAN for November 22nd, 1913, page 398, which reads as follows:

"It is claimed that some of the eucalyptus of Australia are taller than the California redwoods, which are commonly considered the highest trees in the world."

Visitors to the Melbourne International Exhibition of 1888 will remember the photographs of a large-butted gum-tree by Mr. N. J. Caire, photographer, who stated that he had come across this monster in Gippsland, and that its height was 464 feet. Here was something very definite to go upon. The trustees of the Public Library, Melbourne, voted £100, the trustees of the Exhibition Building another £100, the Minister for Lands promised a sum not exceeding £800, to have this leviathan measured and photographed. After some hesitancy on the part of the photographer, the identical tree photographed was found. The Inspector of Forests and a Government surveyor measured it accurately, and found it to be 219 feet 9 inches. Here was a comedown. "No tree in the neighborhood reached 300 feet." The Hon. James Monroe, premier of Victoria, thereupon offered a reward of £100 out of his own pocket for any Victorian tree 400 feet in height, *and the reward has remained unclaimed to this day.* Another man claimed to have found a tree there 525 feet high; but it turned out that the above mentioned tree was the one referred to. . . . Prof. Sargent is an eminent authority; . . . . and in view of the actual measurements that he presents, viz., 340 feet in height for a redwood and a girth around the trunk of 107 feet for its congener, the "Big Tree," I am of the opinion that, so far as our knowledge goes at present, California is the home both of the tallest and the broadest trees in the world. (1905.)

When the highest living Australian authority gives the banner to the United States, why should it not be accepted? FREDERIC W. GODING, *Consul General.*

Guayaquil, Ecuador.

Escape from Sunken Submarines

To the Editor of the SCIENTIFIC AMERICAN:

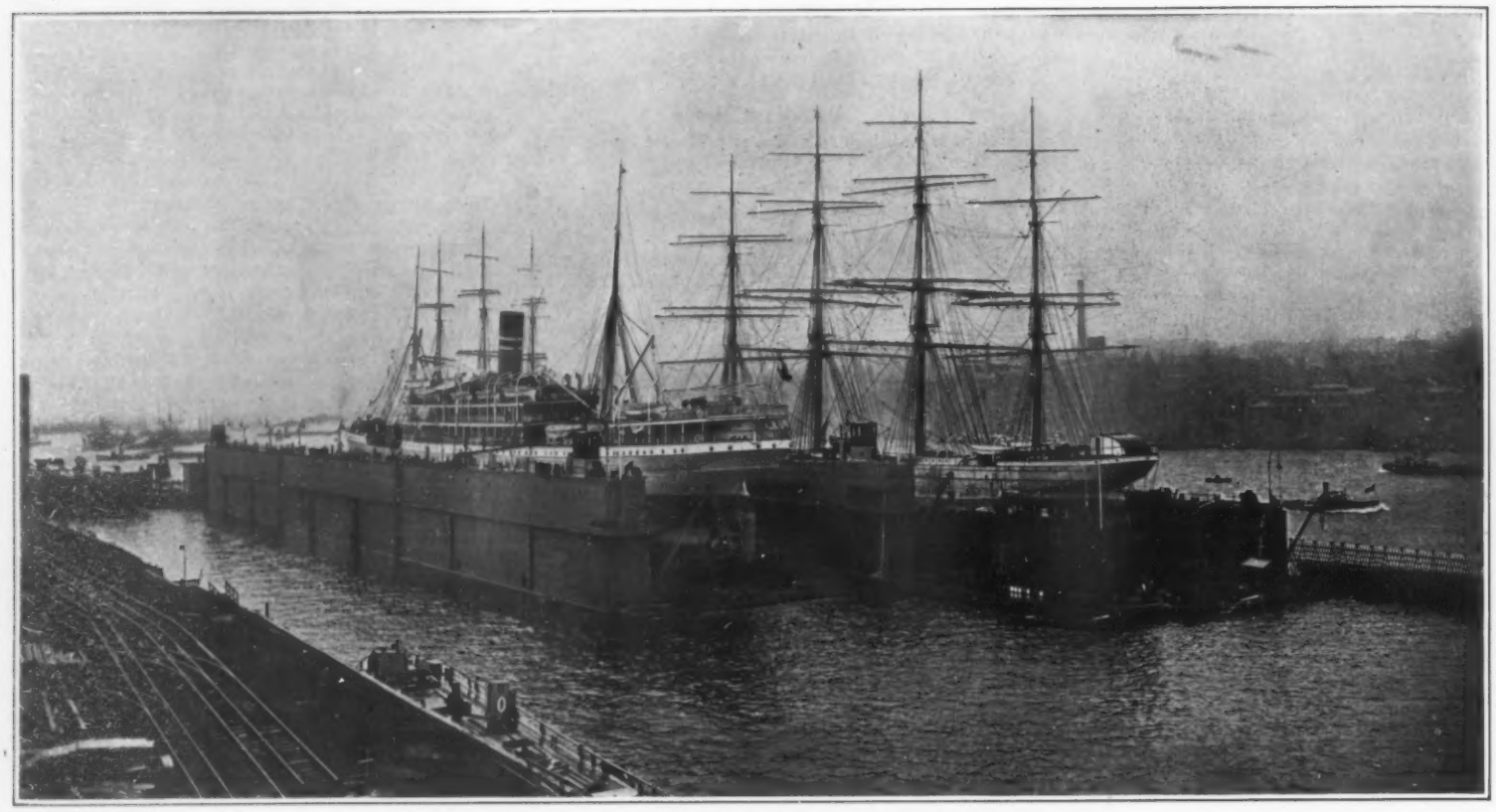
The inability to locate the British submarine A-7, which disappeared after a dive during the maneuvers on January 16th in Whitesand Bay on the shore of Plymouth Sound, and the consequent loss of at least eleven lives, suggests to the writer the desirability of installing on each submarine a device by which the location of a disabled and submerged boat might be readily ascertained.

It would appear to be an easy matter to construct a device similar in general shape to a torpedo, which, in case the submarine was unable to rise to the surface after diving, might be ejected from a torpedo tube. This device should be weighted in such a manner that on reaching the surface it would stand more or less upright in the water like a spar-buoy. At the top of this torpedo-buoy an oiled silk red flag might be attached in the day time, or a device for emitting a dense cloud of smoke, while at night a bright intermittent light might be displayed. To the lower end of the buoy a light cable would be attached, running back to the submerged submarine.

With such a device available it should be a simple matter, in case of accident, to discharge the torpedo-buoy, which on reaching the surface would present a readily noticeable mark to guide searching vessels to the location of the sunken boat. Once located, it would in many cases prove practicable, with the aid of divers, to attach cables to the ringbolts with which I believe all modern submarines are now supplied, and draw the submerged vessel to the surface or to shallow water, where the imprisoned crew could be released.

The writer does not profess to have kept in touch with recent inventions in connection with safety appliances on submarines, but has not seen a discussion of a device similar to that described.

Washington, D. C. HUGH A. BROWN.



These docks with their burdens are shown afloat in the river Elbe, Hamburg.

Steam and sailing ship repairs in floating docks I, II. and III.

The Most Modern Shipbuilding Plant in the World

Where the Two Largest Steamships in the World Are Under Construction

THE systematic and rapid manner in which Germany has built up her navy and mercantile marine is one of the most interesting developments of the modern industrial world. No nation, with the exception perhaps of the British, has understood so well the intimate relation which exists between a national navy and a national merchant marine; and the German government has seen to it that both have received the encouragement which is necessary to an adequate and relative development. The consequence is that Germany to-day not only possesses a powerful navy, replete in all its parts and most excellently administered, but it can lay its hand in case of war upon a vast fleet of mercantile cruisers and colliers (doing daily service in its merchant marine) which stands ready at a moment's call to proceed to its appointed rendezvous to be loaded with the coal, guns, ammunition, stores, etc., which are essential to turn it into a powerful and absolutely necessary adjunct of the fighting fleet.

We in the United States have neither the ships nor the policy—thanks to our fatuous neglect to build up an adequate merchant marine.

The encouragement afforded by the government, coupled with the far-sighted and courageous policy of the capitalist and shipbuilder, has led to the establishment in Germany of several great yards, all of which are capable of turning out warships and merchant steamers of any size, speed and capacity.

It was our good fortune recently to visit the foremost of these yards—that of Blohm & Voss, which is situated on the river Elbe, opposite the city of Hamburg. This firm, the heads of which are Herman Blohm and Ernst Voss, was established in 1877. The plant which they have developed covers an area of about 460,000 square meters and has a water frontage of some 3,000 meters. The shipyard has its own harbor basin, which over a considerable portion of its area, is about 45 feet in depth. The first object that strikes a visitor in approaching the yard by water is the towering superstructure of the building slips—a vast construction of steel columns and overhead girders suspended beneath which is a series of tracks, carrying traveling revolving cranes, capable of handling the heaviest pieces that enter into the construction of a modern warship or ocean liner. This structure is truly colossal in its proportions, and it was easily able to accommodate such ships as the "Vaterland," which is now completing alongside the wharf adjoining the building slip, and her sister ship, which is now in course of erection on the ways. These vessels are 940 feet in length over all, 100 feet in beam, and their height is over 100 feet from the keel plate to the roof of the topmost line of cabins. Despite this great height there is ample clearance between the bottom of the overhead cranes and the top of the ship's structure.

There are five older building slips located on the side of the works nearest the river Elbe, and in these ships up to six hundred feet in length can be built. The larger and more modern slips, above referred to, which face the shipyard basin, are employed in the construction of the battle-cruisers of which this firm has built so many, and merchant ships of the largest dimensions. These berths are served by no less than thirty-four cranes running on fourteen overhead tracks.

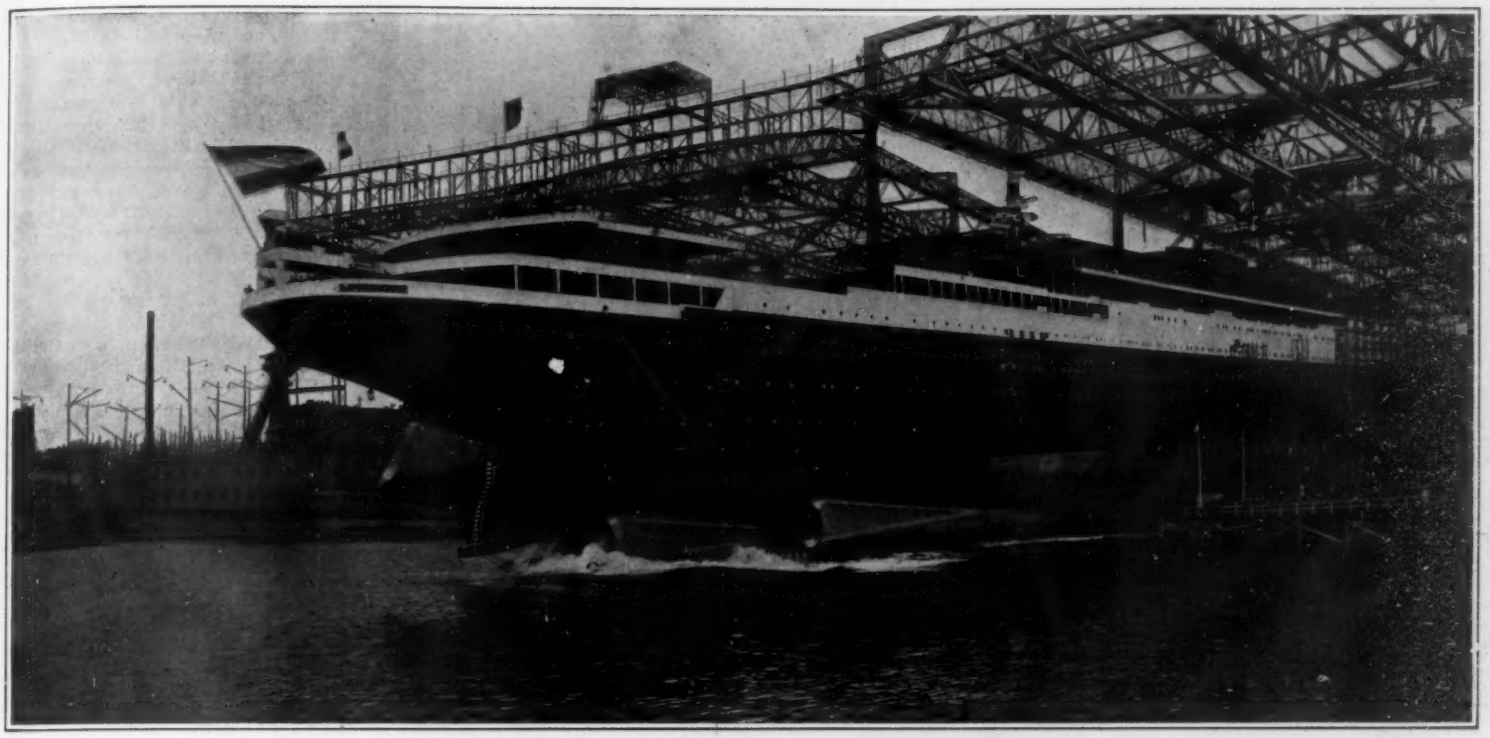
The sheets and structural shapes are heated and bent to form in extensive yards adjoining the slips, and here are found machine tools of the latest and most approved design, rolling mills, forging machines, giant shearing machines and planing and boring machines. High-speed cranes serve to transport the material rapidly from place to place.

Two special shops are utilized for machining engine parts and assembling engines and turbines. One of these is devoted to reciprocating engines and auxiliary engines. The other is given up to the construction of turbines of the largest dimensions, such as those which have entered into the "Vaterland" and are being built for her sister ship. It is needless to say that special tools had to be built for handling and machining turbines of the great dimensions (they are 18 feet in diameter) of these turbines. The material is handled in these shops by high-speed electric cranes, which are specially designed for expeditious transfer from place to place. There are two separate boiler plants. The older one is devoted to the construction of cylindrical boilers such as are commonly to be found on merchant ships; the new boiler shop is given up to the building of water-tube boilers such as are usually installed on warships and high-speed passenger steamers. Special hydraulic and pneumatic machines have been designed for riveting, pressing and bending the steel sheets used in the boiler shops. Autogenous cutting and welding apparatus is extensively employed. Castings of bronze and steel are made in a special bronze and steel foundry.

This crane, the largest of its kind in existence, can lift a load of 250 tons.

Grouped around the larger shops are smaller but not less important plants, such as machine shops, carpenter shops, wood-drying and seasoning plants, a model-making shop, sawmills, paint shops and the usual auxiliary establishments of a great shipyard.

One of the most interesting objects in this yard is the huge 250-ton crane, which stands on the edge of the main basin. At present, this is the largest crane of its kind in the world. There are also a 160-ton crane, a 100-ton crane and one of



This ship, built for the Hamburg-American Line, is the largest in existence. As she went down the ways her weight was 31,000 tons, and the launch took place without a hitch. She is 940 feet long, 100 feet beam, 73½ feet in plated depth, will weigh fully loaded 60,000 tons and will steam 23 knots. She differs from the "Imperator" in having a cruiser stern.

The launch of the "Vaterland" at the Blohm & Voss yard, Hamburg.

50 tons. For the transportation of material within the shipyard itself, a large number of traveling steam and electric cranes are employed. Material is extensively hauled by automobile trucks; and, of course, by locomotives running on tracks of both narrow and broad gage.

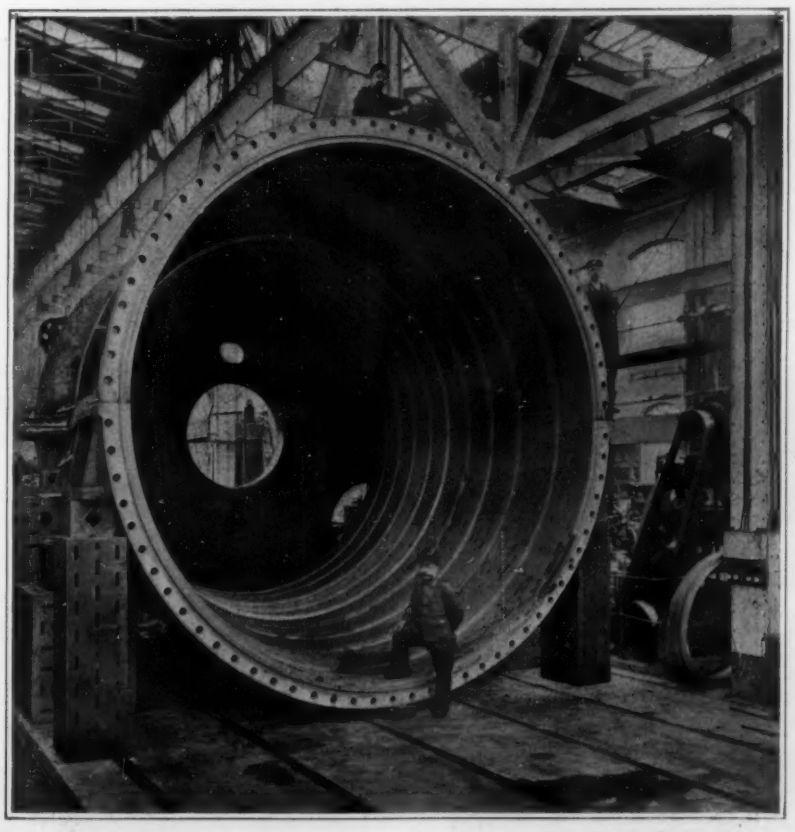
Power for operating the plant is generated in several large central stations in which reciprocating engines and turbines as well as air compressors and hydraulic pumps are installed. This energy is distributed by an extensive electric, hydraulic and pneumatic system over the entire yard. In addition to the power plants there are also gas plants for generating oxygen, hydrogen, acetylene and water gas. The oxygen, hydrogen and acetylene are employed in cutting and welding; the water gas is used chiefly for heating purposes.

The yard possesses a very fine laboratory and testing plant, both of which are equipped with modern instruments of precision for carrying out physical, microscopic and chemical investigations.

A characteristic feature of large German commercial establishments of this kind is the great attention which they pay to the design of their office buildings, which are often, as in this case, examples of very careful and highly artistic architectural planning and design. In the case of the Blohm & Voss yard, the technical and administrative staff is housed in a five-story structure of very appropriate design. The total number of officials and workmen employed at the present time is about 11,000.

As is well known, this yard has taken a prominent part in the building of war vessels for the imperial German navy; in fact, all the successful German turbine-driven battle-cruisers such as the "Von der Tann," "Moltke," "Goeben," and "Seydlitz" were built by Blohm & Voss; and they now have under construction a large battle-cruiser in which they are installing turbines of 100,000 horse-power, which are expected to give to the vessel a speed of 30 knots, if not more. In addition to the "Vaterland" and her sister, both of which are turbine-driven, the firm is building for the South American Line in the Hamburg-American Company, a triple-screw steamer which is driven by a combination of two reciprocating engines and one turbine. They are also building large docks for the Imperial German and the Imperial Austrian Navy.

A feature of the yard is the large dockage capacity, and especially the floating docks, the capacity of the five docks being 88,200 tons. This is the largest privately owned dockage in Germany, and the firm possesses the only floating dock capable of lifting the "Imperator."



Casing, 18 feet in diameter, of one of the low-pressure turbines of the "Imperator."

The Chestnut Blight

A PRELIMINARY report of the Pennsylvania Chestnut Tree Blight Commission now being distributed gives an interesting summary of the work done under its direction in the effort to combat and eradicate the destructive chestnut tree blight.

The introductory refers to the possibility of a serious timber famine confronting the American people, and the absolute necessity for concerted action of the friends of forestry and forest conservation to avert a threatened crisis. Attention is called to the fact that it costs fully one third more to-day to buy hemlock and other common varieties of building lumber than the same material would have cost only five years ago.

The chestnut blight occasioned a loss of many millions of dollars to the timber owners of Pennsylvania, and since the commission decided to discontinue its operations on account of not having received a sufficient appropriation, especial interest has been aroused, as the total extermination of our native chestnut is threatened. At least a dozen other States continue the warfare against the disease. The Bureau of Plant Industry of the United States Department of Agriculture, co-operated in a practical manner through a large pathological force. The main laboratories are at the University of Pennsylvania.

The reports of the several executive officers and others indicate very clearly that much progress has been made in the study of the proper treatment of infected chestnut trees. Especial attention was devoted to the utilization feature, and in this manner the owner of blighted timber was able to secure a ready market for its disposal at fair prices. The educational work enabled owners of trees to recognize the disease, and to obtain needful information of much value without cost, as to the treatment of diseased trees. The blight has been eradicated from the western part of the State, but spot infections will most likely reappear. Unless timber owners watch carefully, and destroy such infections promptly, the blight will spread rapidly and further heavy losses will inevitably follow. In eastern and southern Pennsylvania a large percentage of the chestnut was badly infected before the commission was created by legislative enactment.

Recent cablegrams prove that the chestnut blight is prevalent in China, and therefore, probably of foreign origin. Hence there is greater hope now that continued scientific research work such as is now in progress in this country, will reveal the much needed remedial measures to prevent the threatened total extermination of our native American chestnut trees.

The report contains seventy maps and engravings, and is worthy of careful preservation, as the literature upon this tree pest is limited, although the subject is an all important one from an economic standpoint. As a destructive parasitic fungus, the chestnut tree blight has done incalculable damage. It is a matter of deep and sincere regret and a direct loss to the State that no larger appropriation was granted by the Legislature.

A Good Grade of Excelsior is being made from fire-killed Alpine fir and Engelmann spruce in Colorado.

Automatically Reversed Trolley

AT the main station of the Pacific Electric Railway, from which all of the three-car interurban trains enter and leave Los Angeles, the danger to conductors as well as time lost in reversing the trolley has been done away with by an automatic system. The grooves overhead in the station are arranged in a Y shape. The incoming car is reversed and this causes the trolley pole to run off laterally on one arm of the Y until it comes to the junction with the other arm. Then continued motion of the car drags the trolley back to the main line on the second arm of the Y. In this way the trolley is reversed without any delay; and as it is not necessary for the conductor to swing the pole around and walk across adjoining tracks in doing so, a common source of accident is eliminated.

Mail Carriers on Roller Skates

THE delivery of parcel post packages by United States mail carriers equipped with roller skates is the latest scheme devised to save time in this branch of the Government service. Incidentally, it also seems destined to cut quite a figure in the saving of shoe leather for post office employees.

The idea was originated by the foreman of the check room in the Chicago post office. In the basement of the building is a clear space of over 300 feet of smooth concrete flooring, on either side of which are arranged a total of 1,400 carriers' lockers. The checking of uniforms during the rush hours taxed the force of men in charge of this work to the limit. Then the plan of providing the checkers with roller skates was hit upon, with the result that the time formerly required for carrying uniforms from one end of the locker room to the other was cut to one fourth. Following this the scheme was applied to the moving of packages of mail from one part of the building to another, and finally as a means for the regular delivery of parcel post packages on the outside.

The success of the experiment was such that Postmaster Campbell of Chicago predicts the plan will soon be generally adopted in all large cities in the country.

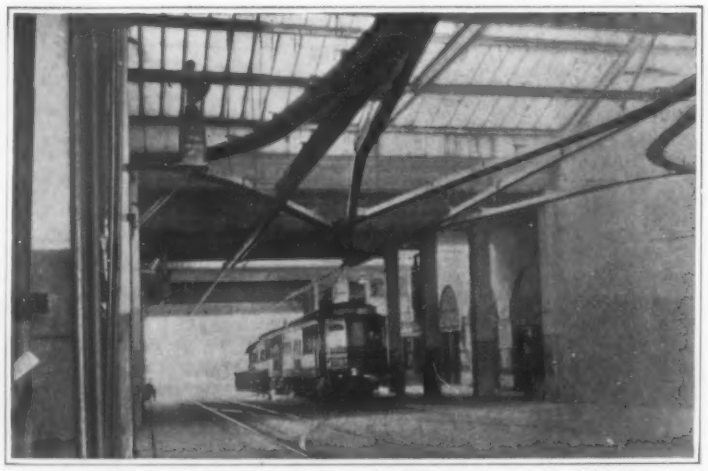
A Sea-going Dredge for China

IT would appear at first sight that in China manual labor for dredging work would be much cheaper than mechanical work, but, despite the fact that Chinese labor charges are five times lower than in Europe, mechanical appliances are proved to be much below the cost of manual labor. This difference is brought about not only by reason of the high power developed in a dredging plant, but also by reason of the fact that coal is 50 per cent cheaper in China than in Europe, and also the weather does not affect the general expenses with dredging machinery so much as human labor.

Pictured herewith is an interesting dredge recently built for the Hai-Ho Conservancy Board, Tientsin. The dredge is of the barge-emptying and suction-loading type, and is capable of discharging the spoil into barges alongside, or through a floating pipe-line 1,000 feet in length, or through a shore delivery pipe-line over a distance of 9,800 feet.

The vessel is used as a suction dredge, either working at side anchors or in motion, and as a stationary pumping station for the discharge ashore of spoil out of barges. When pumping while in motion the dredger is arranged for discharge over either side into barges towed alongside, or through an opening in the bow, to which opening a floating pipe-line is fitted when dredging at side anchors. To balance the vessel the shore delivery pipe-line is fitted on the port side, while the barge suction is usually effected over the starboard side. The suction pipe for direct dredging at anchor is provided with a suction mouth, armed with a sleeve, so fitted as to avoid clogging when dredging a furrow 8 feet deep in easily collapsible earth. When the dredger is in motion the suction pipe is capable of reaching to a depth of 20 feet, and when dredging at anchor with a different suction mouth, of reaching to a depth of 25 feet. The normal service speed is approximately 8 knots.

When working as a pumping station, the dredge discharges the spoil through a 24 3/8-inch pipe-line, and delivers by means of its sand pumps 46 cubic yards of water per minute at 150 revolutions of the engine, while for the water pump the output is 47 yards with 160 revolutions of the engine. When dredging at anchor and discharging through a 1,000-foot floating pipe-line of 20-inch diameter, using one sand pump, the duty for the sand pump is 46 cubic yards per minute with 160 revolutions of the engine, while when dredging in motion and delivering into barges alongside, the output of the sand pump is 90 yards per minute at 150 revolutions of the engine.



System of overhead switches for automatically reversing a trolley pole.

Roller skates save time and shoe leather in the Chicago post office.

Twin-screw barge emptying and suction loading dredge for China.

Steam road paver used by the Milwaukee highway commissioners.

The Largest Flagpole

A CONSULAR report states that what is claimed to be the largest one-piece flagpole in the world is to be erected on the grounds of the provincial courthouse in Vancouver, British Columbia. The pole is a British Columbia fir, 205 feet in length, weighing approximately 5 tons after being dressed and allowed to season six or eight months. It will be set in a foundation of concrete 10 feet deep, giving it a height of 195 feet above the ground.

Electrification of Swiss Railways

A CONSULAR report states that Swiss federal engineers are watching with much interest the experiment of operating the Lötschberg Line by electricity, and that if it succeeds the St. Gothard will undoubtedly be equipped with the same motive power. In fact, the electrification of all Swiss railways seems to be the logical outcome of the fact that Switzerland produces no coal, but on the other hand is rich in water-power resources.

Steam Road Pavers

THE accompanying illustration shows a steam engine road paver at work on a long stretch of concrete extending out of Milwaukee.

Similar machines have been operating at Cleveland, Ohio, with a paving process consisting of a liquid asphalt combined with other ingredients which is mixed with sand and stone cold, and laid in this form.

This machine has a capacity of 20 cubic feet of loose material unmixed or 15 cubic feet of mixed concrete. The loading skip is 8 feet wide, permitting three wheelers to empty their barrows at once. The power plant is centrally located, the boiler being underslung. The loading skip has a very wide nose, so that it discharges into the mixing drum quickly and without any clogging tendency. The distributing spout is 15 feet long and is equipped with blades. As this distributor revolves it will of course continue mixing the batch right up to the point when it is discharged in the street. The equipment will handle three batches at the same time. While one batch is being loaded into the skip, another batch is being mixed in the drum and the third batch is being discharged from the distributor.

All levers are banked in one place, so that the engineer has absolute control of the machine, and can operate it himself. This machine is equipped with steering wheel, forward and reverse traction mechanism, compensating gears similar to those used in an automobile. As a two-bag machine the capacity has been greatly increased, the records made this season showing that it will easily average from 180 to 200 cubic yards of 6-inch base per hour.

It is said that the best record of a road paver of this type was 1,142 square yards of 5-inch base in less than 5 hours, at a cost of 3.7 cents per yard, with 23 men. Several other machines have nearly equaled this record.

The Heavens in February

Uncertain Orbit of Delavan's Comet—Counting the Nebulæ

By Henry Norris Russell, Ph.D.

DELAVAN'S COMET, whose discovery was mentioned last month, is still under observation in the evening sky. It is however of about the eleventh magnitude, and is therefore visible only in telescopes larger than the average amateur possesses. Its orbit is still very uncertain; in fact, the results obtained by different computers differ radically, indicating that this again is probably one of the cases where two solutions of the problem are theoretically possible. That is, there might be two quite different orbits, so situated that a pair of comets, moving each in one of them, might be in line with the earth at the dates of all three observations, though before or after this interval of time they would appear to separate slowly from one another in the sky.

In such a case it may not be till some little time after the discovery of a comet that it can be distinguished with certainty in which of the two possible orbits it is actually moving, though ultimately this can always be done.

In the present instance, the preliminary orbits, computed from observations on three consecutive days, are described by the computers as "very uncertain." Messrs. Einarsson and Nicholson, at the University of California, deduce a highly inclined orbit, with the very small perihelion distance of one twentieth of the earth's distance from the Sun, and perihelion passage on June 28th, 1914. Kobold, on the other hand, finds the inclination small, the perihelion distance one ninth greater than that of the Earth, and the time of perihelion passage as March 2nd.

If the latter orbit is nearly correct, the comet should remain in the evening sky, and move northward and eastward, gradually growing brighter until the end of February, but probably not reaching the naked-eye limit.

According to the ephemeris computed from this orbit, the comet should be in 3 hours 6 minutes right ascension, and 4½ degrees north declination on January 28th, the last date for which the calculations are made. Extending the ephemeris roughly, we find that on February 13th it should be in about 3 hours 35 minutes, plus 14 degrees, moving northeastward at an increasing rate.

If the alternative orbit is correct, the comet will increase enormously in brightness, and be a very conspicuous object next June; but until further and better computations are available, it is of no use to attempt to say more. We may console ourselves with the knowledge that, according to either orbit, the comet will continue to grow brighter until well into March, so that the fuller information which will no doubt be available next month will not come too late.

Of other astronomical publications which have recently come to hand, perhaps the most interesting is a paper by Prof. Fath, formerly on the staff of the Mount Wilson Observatory, upon the number of nebulæ shown upon photographs with the great 60-inch reflector. The plates upon which these nebulæ appear were taken in accordance with Prof. Kapteyn's "Plan of Selected Areas," in which certain regions of the sky uniformly distributed over the heavens and about 15 degrees apart, are photographed with long exposures, so that studies may be made of the positions, motions, brightness, color, etc., of the very faint stars (which are so numerous that it is hopeless to try so much as to count them over the whole area of the heavens). Upon the plates of 139 such regions (distributed from the North Pole to 15 degrees south declination) Prof. Fath has identified 167 previously known nebulæ and 864 new ones, most of which, of course, are small and faint. If these selected areas are typical of the whole sky, as there seems good reason to suppose, the whole number of nebulæ in the heavens, capable of being distinctly photographed with the 60-inch reflector, giving one hour's exposure on the fastest plates (Lumière Sigma), should be 162,000. Many of the larger of these nebulæ show distinctly the familiar spiral structure. The smaller ones are usually too small to show any such details; but on account of their usually elliptical form, Dr. Fath considers that a large proportion of them are also unsolved spirals.

The distribution of these nebulæ over the heavens follows the law, long known to be true, that they are *least* numerous in the Milky Way, and thickest strewn near its poles. In fact, on the diagram which Prof. Fath gives, showing the whole number of nebulæ (including his discoveries) photographed in each region, the Milky Way is immediately conspicuous as a broad blank belt. Most of the plates in the Milky Way show no nebulæ at all, some exhibit one or two; while the four regions nearest to the north galactic pole contain no less than 227 of them—nearly one quarter of the number found in the 139 regions photographed at Mount Wilson.

One of Prof. Fath's results shows that the number of nebulæ in the sky is not as great as had previously been supposed. The best previous estimate, based upon 104 plates taken at the Lick Observatory, had put the whole number of nebulæ in the sky at half a million—three times larger than the present figures. Though the exposures of the Lick plates were three hours long, Dr. Fath shows that the greater sensitiveness of present day plates, and certain other advantages of the Mount Wilson reflector, make it possible to photograph equally faint objects with the exposure of one hour which he used. Dr. Fath however clears up the difficulty by recalling that the Lick photographs were made primarily for the study of certain conspicuous nebulæ. The great number of faint nebulæ shown, in addition to the bright ones, on the resulting plates led to the estimate that there must be half a million in the whole sky. But these brighter nebulæ, like the fainter ones, are strongly clustered in some parts of the heavens, and hence the Lick photographs are mainly of regions which are much richer in nebulæ than the average of the sky. The Mount Wilson plates, being taken on a plan which was carefully designed to avoid giving an undue preference to any region of the sky above any other, are free from this tendency, and hence the number of nebulæ, estimated from them, is probably nearly correct.

At 9 o'clock : Feb. 6.
At 8½ o'clock : Feb. 14.
At 8 o'clock : Feb. 21.

At 9 o'clock : Mar. 8.
At 8½ o'clock : Mar. 16.
At 8 o'clock : Mar. 23.

At 9½ o'clock : March 1.

NIGHT SKY: FEBRUARY AND MARCH

The Heavens.

As our map shows, the finest region of the sky is now in the southwest and west. The twin stars of Gemini burn near the zenith, attended by their fainter companions. Below them in the west shine the ruddy Aldebaran, the golden Saturn, and the brilliant and fiery Mars. Capella, with its lesser neighbors in Auriga, is high in the northwest, with Perseus and Andromeda below.

The incomparable Orion brightens the southwestern sky, followed by the noble outline of the Great Dog, whose minor stars seem fainter than they really are, since the surpassing brilliance of Sirius quite outshines them. Compared with these constellations, those of the eastern sky are dull. Leo, high up and almost due east, is the most prominent group. Below it is the greater part of Virgo, and to the right rises the huge length of Hydra, stretching from near the zenith to the horizon and below it.

Arcturus has just risen, a little north of east. Farther north and higher up is the Great Bear, now splendidly displayed. The Little Bear is on the right of the Pole, and Draco, Cepheus and Cassiopeia are low on the northern horizon.

The Planets.

Mercury is an evening star all through February, and is very well placed for observation. To be sure, he is almost at his nearest to the Sun, being in perihelion on the 21st, and at his greatest elongation, 18 degrees 8 minutes east of the Sun, on the following day, but this very nearness makes him exceptionally bright, while his favorable declination, about 8 degrees north of the Sun, keeps him in sight until 7:10 P. M., an hour and a half after sunset.

At this time he is in Pisces, not far from the vernal equinox, but remote from any bright star. Since he appears brighter than Saturn, and equal to Mars, there can be no possible difficulty in identifying him.

Venus is in superior conjunction with the Sun on the 11th. Theoretically, she is a morning star before this date, and an evening star afterward. Practically, she is invisible throughout the month.

Mars has passed opposition, and is receding from us and growing fainter; his apparent stellar magnitude changing from −0.6 to +0.01 during the month, corresponding to a loss of half his brightness.

He is nearly stationary in the western part of Gemini, moving westward at first, then retracing his path eastward, but a little more to the south. In the telescope, he shows a disk varying in diameter from 14 seconds on the 1st to 10.8 seconds on the 28th, and distinctly gibbous, like the Moon two days from the full. Jupiter is a morning star in Capricornus, and rises about 6 A. M. on the 15th, so that he is too near the Sun to be easily seen.

Saturn is in Taurus, conspicuously placed, setting a little after midnight on the 1st, and about 10:30 P. M. on the 28th.

Uranus is morning star in Capricornus, but is too near the Sun to be seen.

Neptune is in the western part of Gemini, his position being 7 hours 53 minutes 21 seconds + 20 degrees 27.0 minutes on the 2nd and 7 hours 50 minutes 58 seconds + 20 degrees 33.8 minutes on the 26th. He is of the eighth magnitude, and so can be seen even with a good field-glass; but he can only be distinguished from the faint stars all around him by the aid of his motion (making diagrams from night to night) unless a powerful telescope is available.

The Moon.

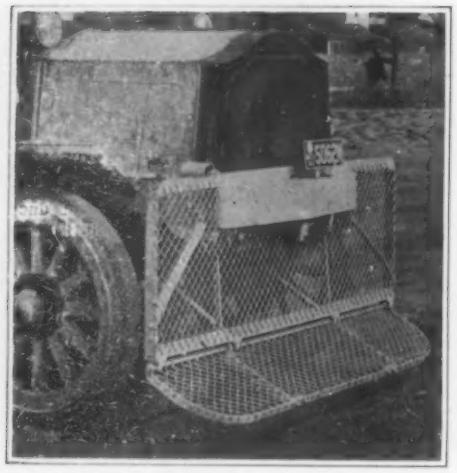
The Moon is in her first quarter at 6 A. M. on the 3rd, full at 1 P. M. on the 10th, in her last quarter at 4 A. M. on the 17th, and new at 7 P. M. on the 24th. She is nearest us on the 12th, and farthest away on the 28th.

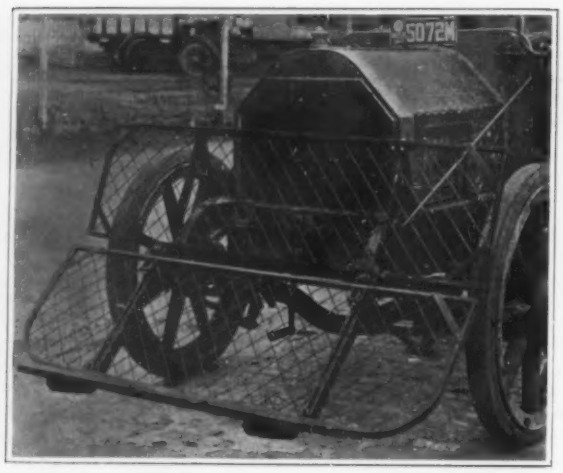
She is in conjunction with Saturn on the 5th, Mars on the 7th, Neptune on the 8th, Jupiter and Uranus on the 22nd, Venus on the 25th, and Mercury on the 26th. In the case of Mars, an occultation is visible from certain parts of Asia, but not in our part of the world.

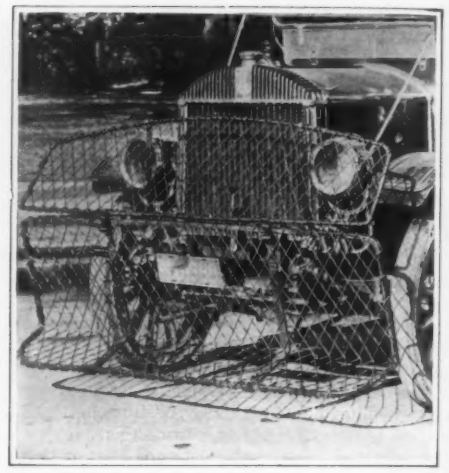
There is an annular eclipse of the Sun upon February 24th, but it is unlikely that it will be observed at all, unless from some ships at sea, for the region from which it may be seen lies entirely in the South Pacific and the Antarctic regions.

Princeton University Observatory.

To Stimulate Internal Combustion Turbine Development.—It is proposed that the Royal Automobile Club of Great Britain offer a suitable prize for the best practically useful rotary or turbine oil or spirit engine satisfactorily applied to a motor vehicle and entered for trial under R. A. C. regulations in 1915. It is believed that in so far as invention has progressed, sufficient inducement is offered for the expectation that inventive genius may solve this troublesome problem, and the prize will be offered as a stimulus. The amount of the prize has not been stated.







Three of the types of motor truck fenders that have been approved by the city of Detroit.

Fenders for Commercial Vehicles

THE question of the necessity for some sort of fender on commercial vehicles long has been pondered by municipal authorities in nearly every large city where the steadily increasing number of heavy self-propelled motor trucks serves always as more or less of a menace to life and limb and property. Not until now, however, has any concerted action seeking to a solution of the problem been taken. The city of Detroit, which is literally the hub of the American automobile universe, has taken the bull by the horns, so to speak, and has made it compulsory upon the owners and operators of commercial vehicles to equip them with fenders, as, a long time since, the traction companies were compelled to equip their rolling stock with them. The action of Detroit in thus compelling the use of such devices is taken as but a prelude to similar action on the part of Chicago police authorities and those of other large cities in the United States, and, incidentally, it opens up a large field for inventors of contrivances of the like. Three of the types of fenders that have been formally approved by the Detroit authorities are illustrated herewith, though the pictures scarcely can be taken as an indication of exactly what the police department wants, for it has given no inkling nor idea nor specifications of its particular desires. It is stated only that the lower bar of the fender submitted for approval must be not more than six inches from the roadway when the truck is being operated either light or loaded on the city streets.

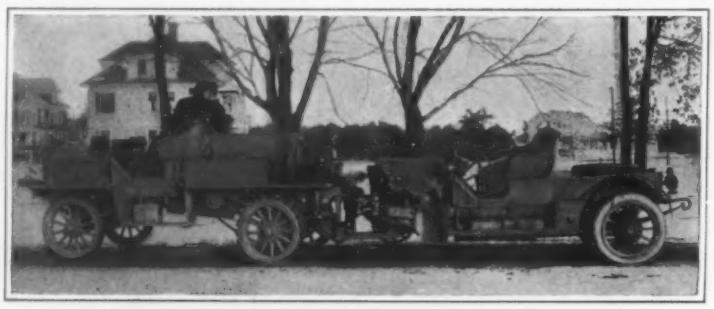
Motor Truck for Mine Rescue Work

THE recurrence of mine disasters, revealing as it does the almost pitiable equipment that is available for the relief of entombed miners, has served to emphasize the need of modern apparatus and appliances with which to carry on rescue work, and acting upon the suggestion conveyed by the successful use of commercial motor vehicles in other fields, the Bureau of Mines of the Department of the Interior at length has developed a plan which revolves chiefly around the use of a new and special type of vehicle thoroughly and properly equipped for the purpose.

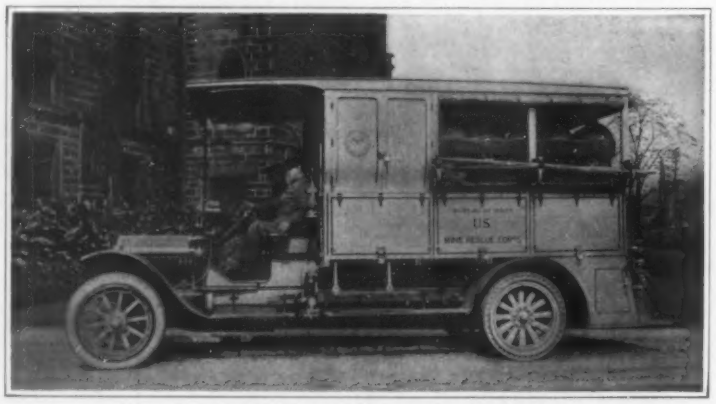
The vehicle itself, which already has been delivered to the Bureau of Mines in Pittsburgh, is illustrated herewith and from the picture some idea of the completeness of its equipment may be gained. Instant access to everything the truck carries for rescue or hospital work is absolutely essential, of course, and for this reason the body, except for the space occupied by the crew, is virtually a series of lockers and compartments and the interesting feature of them is that in nearly every case they open from the outside and are held closed only by snatch hooks.

The equipment of the truck is most complete; the devices it carries form an uncommonly long list, including even the caged canary that has proved so useful in determining the existence of poisonous gases. By way of emphasizing the great amount of apparatus that is carried it is interesting to note that there are included no less than ten complete resuscitating outfits. The oxygen tanks, of which there are six, are carried beneath the body on a sub-frame and are so placed that they can be drawn forth from outside the truck. The oxygen pump is operated by the truck engine and is mounted at the left side of the chassis. Directly behind the driver's seat there is a series of compartments containing a tent, 22 feet of hose, three miner's picks, three shovels, a four-pound sledge hammer and two axes. The seats for the crew are behind these compartments and beneath them there is more storage space with another large locker, made up of a series of shallow drawers below the steps at the rear. These drawers serve to hold saws, hose couplings, reducers, spanners and 200 feet of half-inch rope.

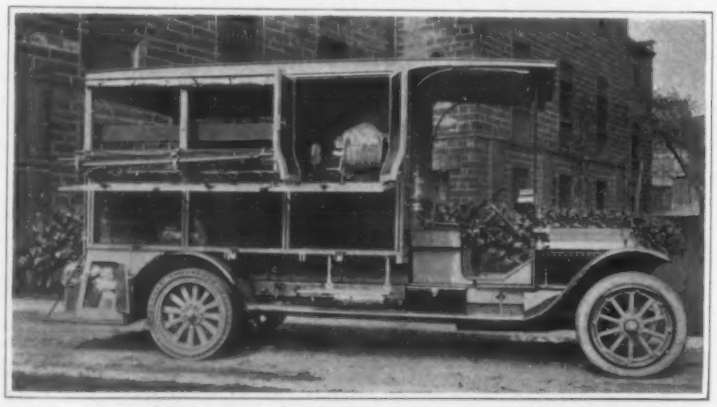
In the central compartments along the body there is a life line reel, a complete telephone system for mine communication, and a various assortment of necessaries such as compasses, tools, and snatch blocks and tackle. Stretchers and fire extinguishers are disposed on the outside of the body by means of special hooks. On the running boards there are two more large boxes which are used to house mine lanterns and other miscellaneous equipment. Completing the equipment there is an eight-inch swivel headlamp mounted on the dash.



Emergency truck towing a machine damaged in a trolley car collision.



Rescue truck of the United States Bureau of Mines.



The rescue truck carries pulmotors, oxygen pumps, respirators, fire extinguishers, a telephone system, miners' tools, and medical supplies.

Motor Truck "Emergency Wagon"

EMULATING the practice of street railroads and gas and electric light companies that must of necessity be ready for all kinds of emergencies, a prominent commercial vehicle manufacturer has prepared and placed in service the emergency wagon that is shown by the accompanying illustration. The wagon is a light commercial vehicle chassis upon which there has been placed a special body equipped with tools, spare parts, and, in fact, everything that may be necessary to succor a crippled car on the road; the equipment is complete even to an extra pair of wheels which may be seen carried at the back of the body. In the picture, the emergency wagon is shown towing a disabled car which is a little the worse for an encounter with a trolley car. The front of the touring car rests on an extension on the emergency wagon, as may be seen, and when this extension is not in use it folds up out of the way.

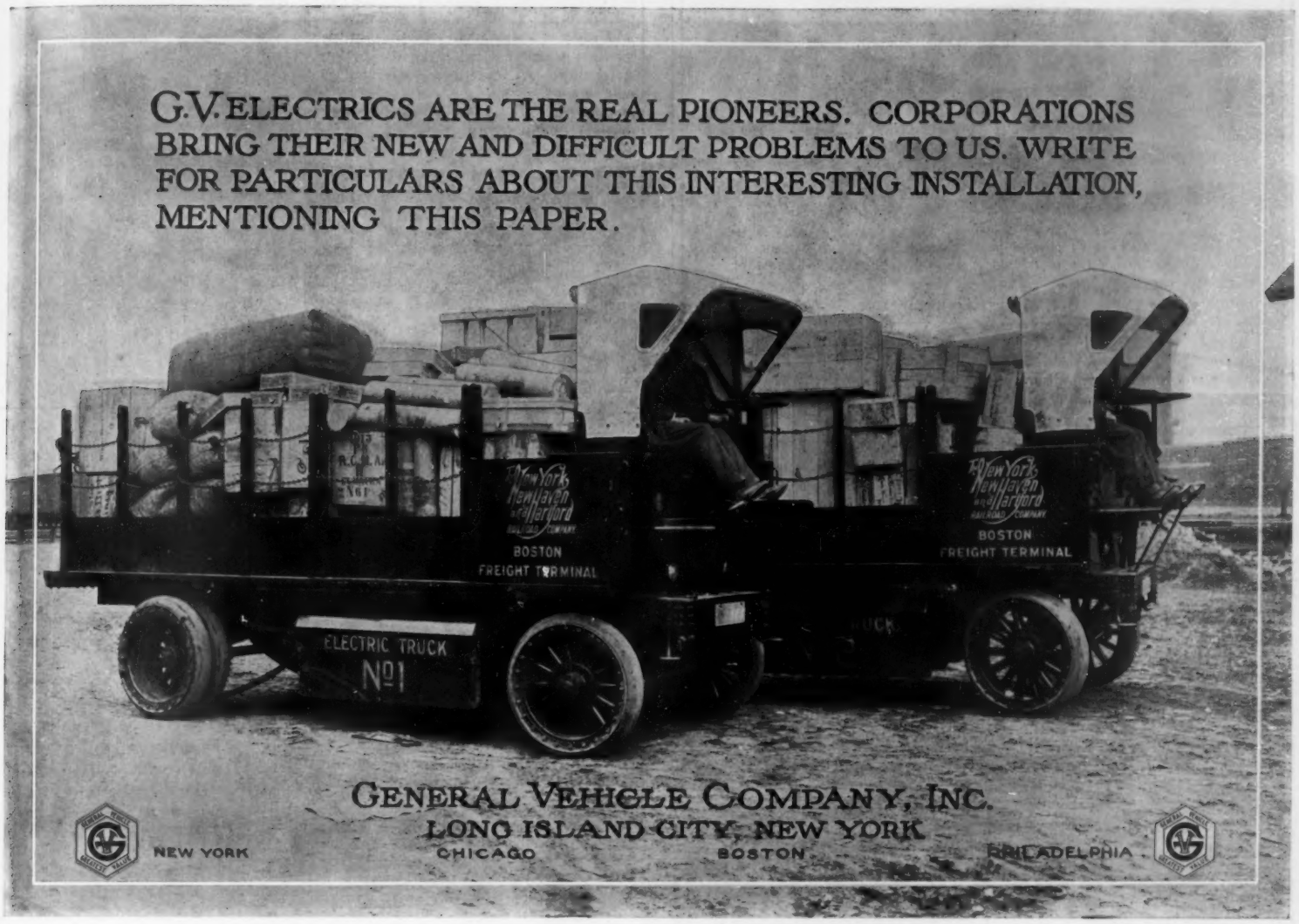
Motor Truck Queries and Answers

P. A. S. writes: "I want to get a two-ton truck, but am puzzled as to the reasons for the two distinct types, i. e., those having the motor forward of the seat—as in the pleasure car—and those in which the motor is placed directly under the driver's seat and floor boards. Can you give me the advantages of each type?"

A. Much depends upon the purposes for which you intend to use the truck and the type and size of body you will find necessary. A motor placed forward of the driver's seat, under the conventional hood, is exceedingly accessible and nearly all parts can be reached easily from a standing position. This design serves to increase the wheelbase of trucks having bodies of only moderate size, and therefore adds to the stability, balance, and ease of riding. Beyond certain limits, however, a long wheelbase becomes a disadvantage. Some designers consider that the motor placed under the driver's seat renders the entire outfit more compact and enables a greater amount of space to be devoted to the body. Although such motors may seem to be somewhat inaccessible, they are in reality easily reached. The driver's seat is either made to tilt to one side or the other, may be removed entirely with but little exertion, or the floor boards and sides may be taken out so that any part of the motor will be exposed. However, the space occupied by the motor of a large truck is so small by comparison with the length of the body that it matters but little whether the motor be placed forward of the dash or under the seat. Leading truck manufacturers produce both styles, and we would not advise that this be a determining factor in the selection of a truck—unless you are to be cramped for room in your garage and need every inch in wheelbase length that you can save.

G. D. P. asks: "Why do we not see more kerosene used as a fuel for motor cars in this country? Do you believe its future lies in its use in the truck or pleasure car? I understand one make of pleasure car has been produced that is intended to use kerosene as a fuel."

A. The fuel problem has not assumed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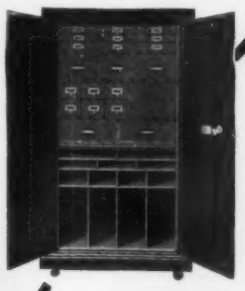

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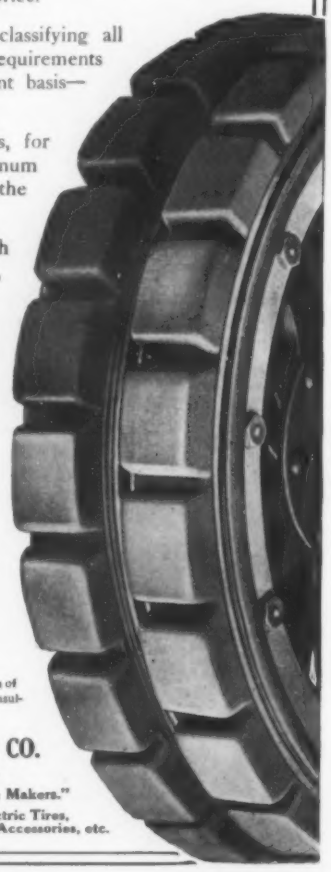

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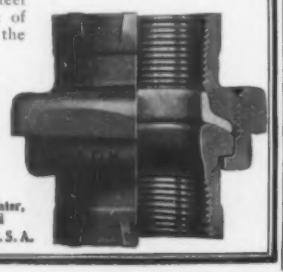

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the serious aspects in this country that is the case abroad. It is in the countries in which we find gasoline at forty, fifty, and even sixty cents per gallon that the greatest interest in kerosene carbureter design is manifested. Notwithstanding the fact that one of the leading pleasure car manufacturers has produced a model, a part of the regular equipment of which is a kerosene carbureter, we believe that it is the truck owners who will first take up the use of kerosene on a large scale. The reason for this assumption is easily understood when it is remembered that a touring car can travel from eight to twenty-five miles on a gallon of gasoline, whereas the mileage of a truck on the same quantity will be from eight to ten. Furthermore, gasoline is a much cleaner fuel to use, inasmuch as any that may be spilled when the tank is filled will quickly evaporate without injury to the varnish, upholstery, or other surfaces of the car. Kerosene, on the other hand, is not as volatile, and any drops left on an exposed surface will soon collect dust and detract from the general "spick and span" appearance of the car. As comfort, utility, and pleasing appearance are most sought after in a touring car, and as economy is paramount in a truck, it is evident that gasoline, as it increases in price, will be in greater demand for the former than for the latter.

Winter Sports in Switzerland

(Concluded from page 93.)

The social form of tobogganing is bobsleighing, which is unquestionably the most enchanting kind of sleigh riding. The inventor of the "bob" is an American, Wilson Smith, and St. Moritz prides itself on having first introduced this sport in 1890. The bobsleigh is composed of two pairs of steel runners, one behind the other, on which rests a wooden seat, about ten feet long and about one foot from the ground, capable of accommodating from about four to six people.

The bobsleigh is now a machine which is the result of a thousand careful experiments, exactly tested and practically constructed. With it results are obtained of which the inventor at first certainly never dreamed. The putting together of the different parts, the dimensions, the weight, the materials of which these parts are made, the construction of the steering apparatus, the choice of brake, all this the sportsman has to study and carefully test, if he would take part in this modern exercise with the fullest success.

Through the simultaneous bending of the team at the curves, greater swiftness is attained, and in addition time is gained by certain motions, carried out at the command of the leader.

On a straight run, the guidance is comparatively simple, though care must be constantly taken, because slight imperceptible unevenness of the run turns the bob continually from its proper direction, and the steersman has to use the greatest attention. With constantly stretched guiding ropes, he must have the two front runners ever in feeling, and guide the bob softly like a well ridden horse. He must also, by steering with presence of mind, be able to parry at once a possible shake. Therefore, in a kind of way, he uses the qualities both of a good horseman and an efficient motorist.

On the curves, which almost form a semicircle, care is to be taken, in the first place, as to the correct entrance. If the entrance be good, the curve is already half done. If the bob runs with full speed to rise over a summit, then it is necessary to guide it with an iron fist through the curve. In coming out of the curve, the triumph of skill is shown in taking one in the opposite direction steadily and without upsetting.

The runners should be of medium length, and not too thick. Leaden ballast of between 50 and 100 kilogrammes (110 and 220 pounds) is always carried. The lead is fitted in plates under the seat board, more in the middle and behind than in front. The runners must be kept quite smooth, and the steering apparatus and brake be always well greased, in order to work easily and correctly. Another very enjoyable snow sport, in the Alps, is ski-

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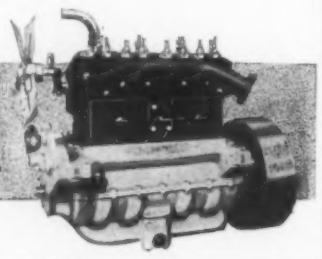

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ing. Its home is in Norway. As a popular and indispensable means of intercourse, it has been used there for centuries. In past times it has been taken up, in a transient fashion, by many countries. As a sport, however, ski running, even in Norway, is still in its youth. The peasants in Telemark, a Norwegian valley, were the first to make the ski a sporting implement. We must thank them that skiing quickly made its way. The performances of the Norwegian ski runners cause universal admiration. Everywhere the ski quickly found a hearty reception, and, to the present day, the number of its votaries increases unceasingly.

There are various shapes of the ski, short and broad, long and narrow, and all with their special purpose, but no form is so well suited for use in mountains, forests and lowlands as that of the Telemark valley.

The length of the ski should depend on the height of the runner; he should just be able to reach their points, when standing upright with outstretched arms, the ski being placed perpendicularly on the ground. Only ash or hickory is used, other kinds are hardly worth consideration. Ash, especially the mountain ash, gives a superior material. Hickory is harder and wears better but is heavier.

"Binding" is the name for the arrangement used for fastening the ski to the foot. Every year new methods are brought out, and patented, but the fundamental system is hard to improve upon.

As further requisites for the ski runner should be mentioned the single and double stick, the fur lining to prevent back slipping, and when on a tour, extra straps and ski points, carrying straps and repairing materials, ought to be provided.

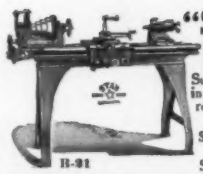
It may interest some to read of gigantic jumps on skis. The longest known jump, to the present time, was executed by T. Smith with a distance of over 49 yards, from the Bolgen jumping platform at Davos, but unfortunately he fell, so that this performance could not be counted, and the record for acknowledged jumps is held by his brother H. Smith with 48 yards. These astonishing performances attract large crowds of on-lookers.

Foolproofing the Motor Truck

(Concluded from page 97.)

which formerly received but scant lubrication, are now provided with grease cups which require only a quarter of a turn each day to supply the necessary lubrication to these parts.

In considering the points covered in the foregoing article, it must be remembered that such designs and attachments as mentioned will not be necessary on all trucks, for many commercial vehicles are designed especially to serve the purposes of those firms who intend to employ only expert chauffeurs. Even such drivers, however, are not perfect, and the tendency of modern truck design is to eliminate all cause of worry on the part of the owner. But, paradoxical as it may seem, in eliminating a part of the "personal element," it is a psychological fact that, in one instance, at least, it has been catered to. The growing application of electric starters to motor trucks is based, not so much on the desire to save work for the driver, but rather on the wish to overcome the one feature of gasoline truck operation in which the electric vehicle was formerly far superior. No matter how expert a driver may be, he will be almost certain to leave the motor running during short stops, and if these are frequent, the gasoline consumed by the motor when the truck is idle may exceed the amount of fuel used during the actual progress of the vehicle. Furthermore, if a gasoline truck is used under these conditions on routes on which the stops are close together and of varying duration, the wear and tear on the motor will be at least appreciable at the end of the year. It is the attachment of the starter, therefore, that is expected to overcome this objection to the use of a gasoline truck for short hauls and frequent stops, for it is hoped that its appeal to the driver's mechanical instincts will prompt him to use the device in preference to leaving the motor running.



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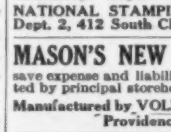
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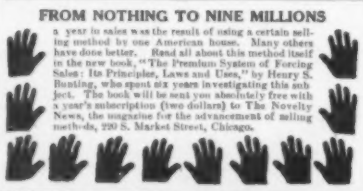
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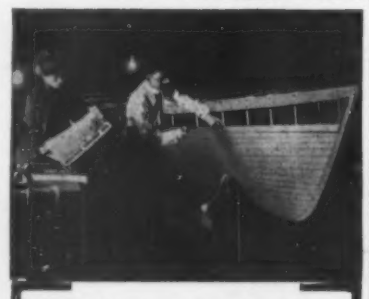

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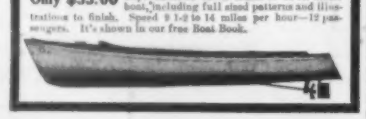

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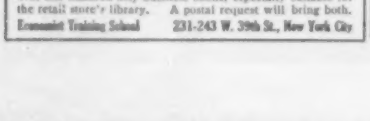

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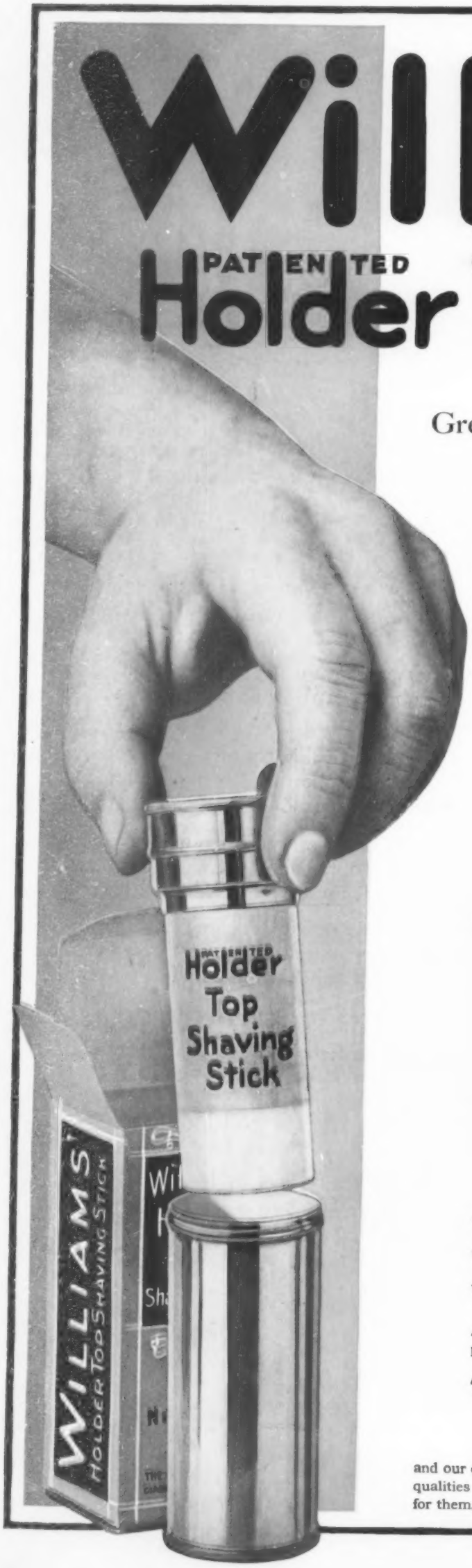

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